

modern machine shop

The MAGAZINE for PRODUCTION EXECUTIVES in METALWORKING PLANTS

AUGUST 1961

MACHINING

MAGNESIUM RACE

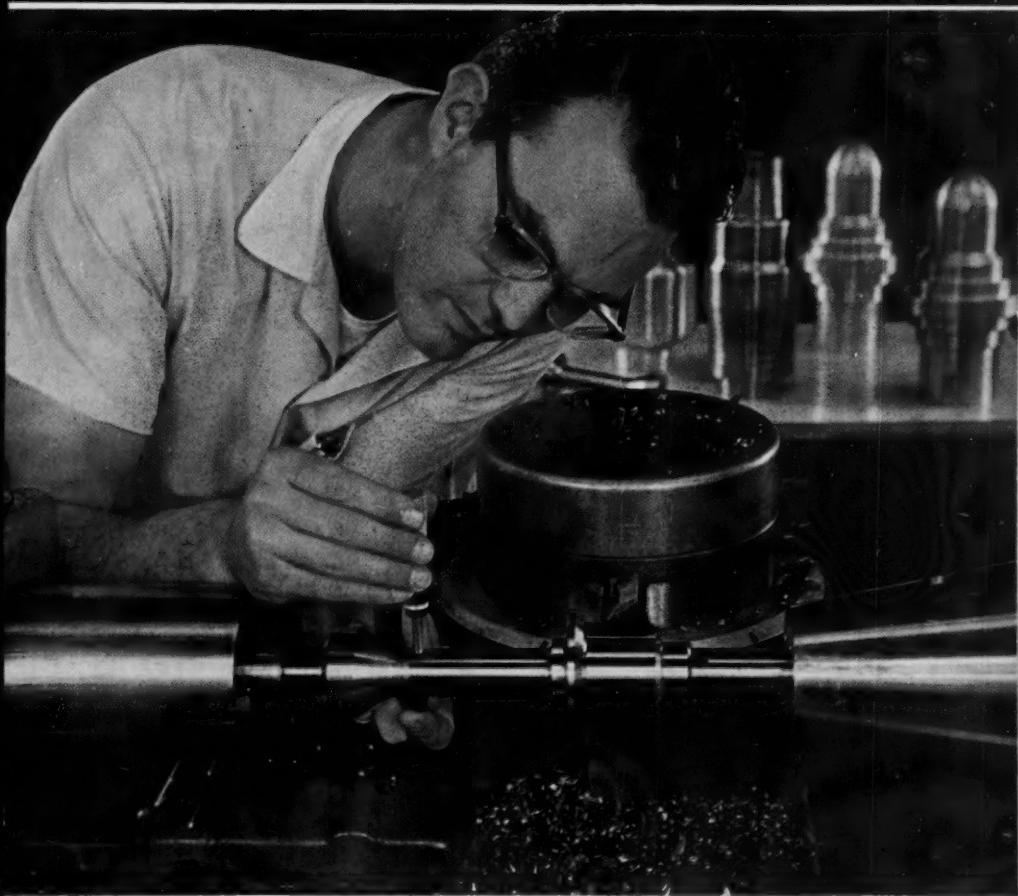
CAR WHEELS

See Page 94

JOB ASSIGNMENT

CONTROL

See Page 100



LEBLOND TAPE-TURN—Numerically controlled, continuous path turning for tremendous savings. Nine Heavy Duty models (now in production) turn rough and finish contours, angles, radii, threads, and straight cuts with speed and accuracy. Many actual case histories. See pages 34 and 35.



EFFECTIVE COOLING...

How to Avoid Barrel-Shape Bores

by Dr. Robert Hahn

Chief Research Engineer
The Heald Machine Company

One of the oldest problems in high-precision internal plunge grinding is that of the unwanted barrel-shaped hole. For some time the cause of this seemingly unavoidable defect was not well understood. How could a perfectly straight wheel, perfectly aligned with the bore, plunge grind a barrel-shape hole?

Recent investigations in this area, as part of our continuing quality improvement program, have isolated the cause and pointed the way to some fairly simple solutions to the problem.

The culprit is *heat*. At the area of contact between work and wheel, the generated heat is more quickly dissipated at the ends of the bore than at the center. This temperature relationship is shown in Fig. 1, with surface temperatures reaching maximum value at the center of the bore. Maximum temperature means maximum thermal expansion—expansion that forces more metal into the wheel at the center of the bore than at the ends. With this unequal stock removal, the bore assumes a barrel shape on cooling. These relationships hold true for plunge grinding, and also, but to a lesser extent, for some cases in traverse grinding where limiting factors require a short stroke.

To reduce the barrel shape, it is necessary to level out the temperature curve—by reducing the amount of heat generated and by providing more effective cooling.

The contact area between wheel and work can be considered as a moving heat source that travels around the bore at a rate equal to the workhead speed. The faster this heat source travels, the less the heat will penetrate into the metal. Hence higher work speeds will reduce local heating. And since the heat generated is a function of contact pressure and surface feet per minute, lighter feeds and slower wheel speeds in such cases also help to reduce the thermal distortion.

Water-base coolants, copiously applied,

have also proved an effective remedy. As shown in Fig. 2, the coolant flow should maintain a full "reservoir" at the bottom of the bore, as well as between the wheel and work. The coolant flow at the bottom of the bore quenches the metal immediately after the ground surface passes the wheel and assures maximum cooling effect before this point again contacts the wheel.

In practically all cases, a judicious combination of these factors—faster work speeds, slower wheel speed, lighter feeding pressure and improved cooling—will reduce the barrel-shape of a bore to negligible values. This study is typical of the continuing research being conducted at Heald to help refine the art of modern metalworking. Your nearest Heald representative will be glad to help you solve your particular grinding or boring problems.

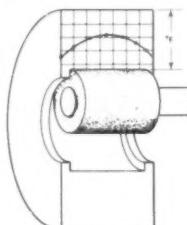


FIG. 1. Section through plunge-ground bore, showing unequal temperature rise in the metal which results in barrel-shape bore on cooling.

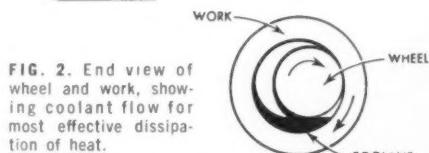


FIG. 2. End view of wheel and work, showing coolant flow for most effective dissipation of heat.

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modern machine shop

For Production Executives

Vol. 34, No. 3, August, 1961

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A STATEMENT OF POLICY—The principal function of MODERN MACHINE SHOP is to search out and disseminate the best and newest ideas for advancement of engineering skill and mechanical efficiency in the metalworking industry and neither effort nor expense is spared in the performance of this task.

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**modern
machine
shop**

AUGUST 1961 VOL. 34 NO. 3

features

page

- 84 ATTACHMENTS ARE USEFUL FOR COMPLETING A PART IN ONE OPERATION

By Noel Brindle

When preparing for the manufacture of a component in the automatic screw machine, the engineer should choose a method which will allow the part to be made in the least number of seconds. It is also his responsibility to eliminate a secondary operation, if possible, by the use of attachments. In recent years several new attachments have been introduced, some of which can be used to complete a part in one operation.

- 94 MACHINING MAGNESIUM RACE CAR WHEELS

By Ted Halibrand

As one of the world's largest producers of magnesium wheels for sports and Indianapolis-type racing cars, increased production of these wheels and reduced fire hazards of machining magnesium have always been two of the major concerns of the Halibrand Engineering Company. After many years of trial and error, these benefits were realized by Halibrand when the company installed a True-Trace Mark II-A tracing attachment on a 19-inch LeBlond lathe. This new combination performs in one pass, with one tool, the work done by four different tool changes with former methods.



- 96 AUTOMATIC DRILLING OF SMALL DIAMETER DEEP HOLES

By C. B. Weidner

In this "how-to-do-it" type article, the author describes and illustrates in detail an effective method devised by a certain manufacturer for automatically drilling small diameter deep holes in oxyacetylene burning tips.

in this issue

page

► 100 PRE-PLANNING SPEEDS JOB ASSIGNMENT WORK

By W. L. Whittier

A new and very comprehensive method of pre-planning each work job before it is assigned has resulted in overall efficiency increases of up to 40 percent in the departments where the new system is being used at the Long Beach, California Division of Douglas Aircraft Company. Called a "Sensitive Job Assignment Control System," the technique has two main objectives—to ascertain that a man can do a job before he is given the assignment, and to eradicate all reasons why the job can't be done in the estimated time.

► 106 COMPUTER AIDS IN DEVELOPING NUMERICALLY CONTROLLED MACHINE TOOL INSTRUCTIONS

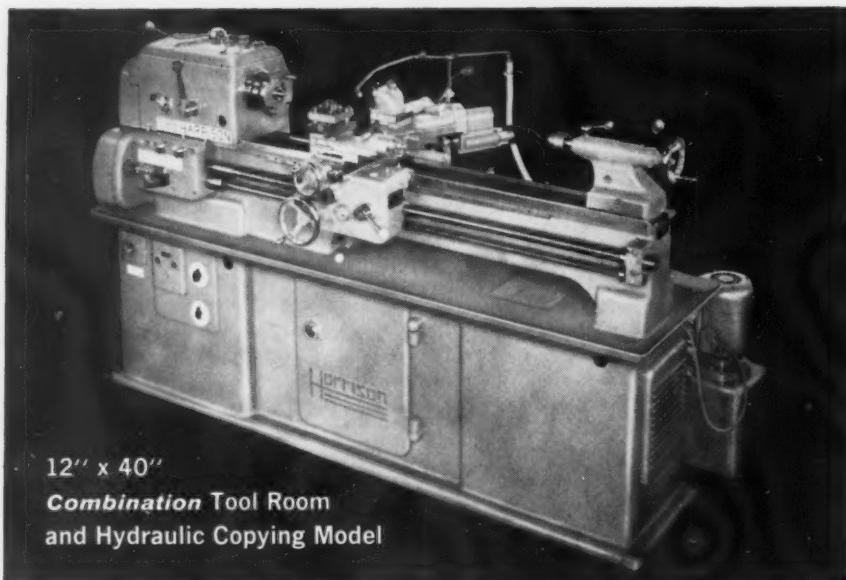
Autopromt (Automatic Programming of Machine Tools), a program which generates the tool paths required to mill complex three-dimensional surfaces with a numerically-controlled machine tool, was announced recently by its developer, the International Business Machines Corporation. These tool paths are produced by a computer in the form of thousands of detailed numerical instruction to the machine tool. These instructions include essential information such as tool bite, feed rate and any other data a numerically-controlled machine tool requires.



► 110 FINISH MACHINING MISSILE NOSE CONES

The hard nose of the U.S. Army's ground-to-air defense system is speedily polished with dual-motor belt sanders developed by the Rotor Tool Company of Cleveland. In use at the Avco Corporation's Lycoming Division, Startford, Connecticut, the belt sanders have halved finishing time on the crucial nose cones of Nike-Hercules atomic-warhead anti-aircraft missiles.

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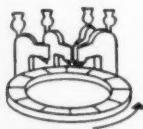
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A FEW OF MANY POSSIBLE RIVETING HEAD POSITIONS THAT CAN BE USED



Rotating fixture showing suggested arrangement of riveting heads.



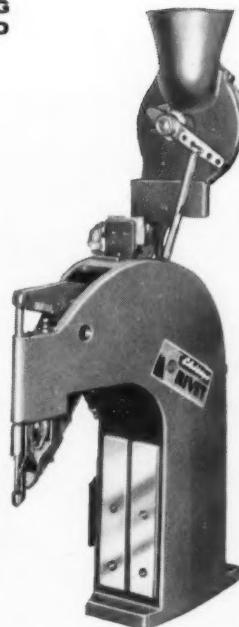
Conveyor Belt permits multiple setting on both sides of an assembly.



Riveting heads can be positioned for operations on flat or curved assemblies.



Sliding fixture used for riveting 2 sides of an assembly.



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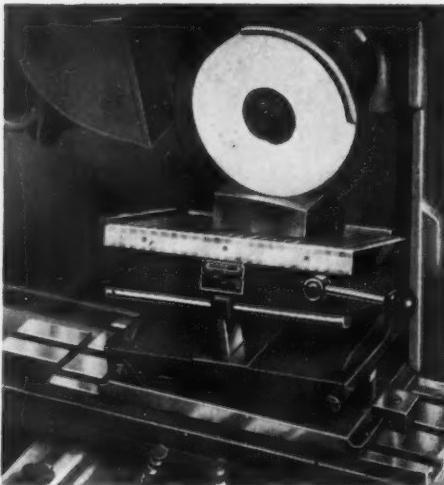
AIR-POWERED RIVETING CATALOG contains description and specifications of 8 multiple riveters—also rivet setters designed for automation.

RIVET CATALOG describes 1388 standard tubular and split rivets, 25 single and multiple motorized automatic rivet setters.

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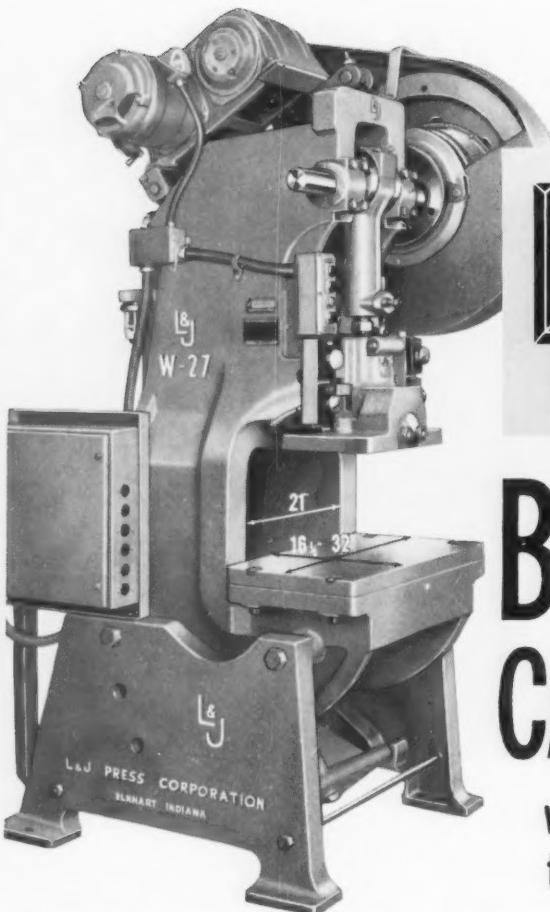
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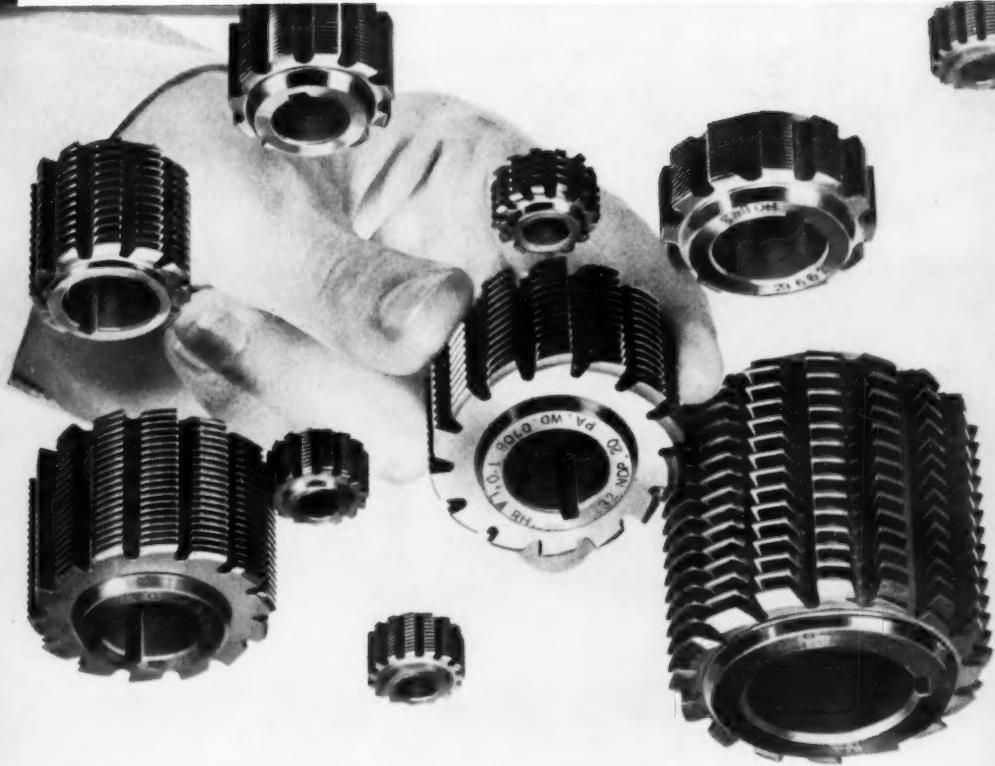
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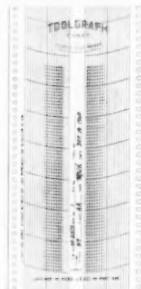
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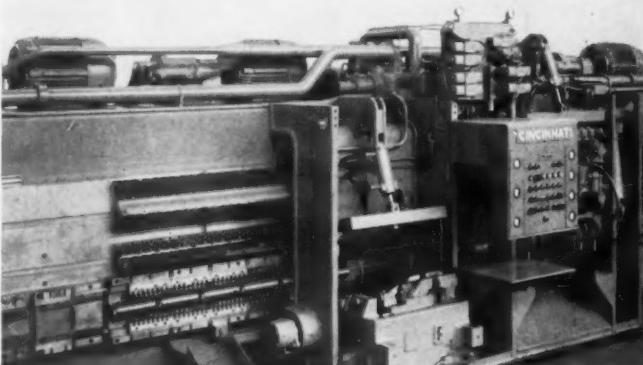
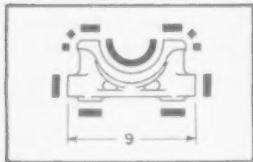
How Throw-away Tool Bits . . .

In the past, throw-away tool bits have proved to be very successful in turning, milling and planing operations. Now, through an ingenious tool holder arrangement developed by Cincinnati Milling, throw-aways are used very successfully for broaching.

As an example of their cost-saving possibilities, let's consider sintered carbide bits. Using only one cutting edge, 20,000 or more parts can be broached. The bits are unclamped, turned 90° and the second edge is available to broach another 20,000 parts, and so on. Both sides of the bit are used (negative rake angle). Then there are eight cutting edges, as indicated at the right. Thus, production totals 160,000 parts; and remember, there is no cutter sharpening expense.

The throw-away idea is but one example of the advanced thinking and modern approach to low-cost production at Cincinnati Milling. May we send you more information?

Throw-away tool bits are one of the many plus factors in reducing the cost of broaching 13 sizes of main bearing caps on this CINCINNATI Horizontal Hydro-Broach Machine. Production, 80 parts per 48 minute hour. Broached surfaces are indicated by heavy lines in drawing of part below. Catalog M-1910.



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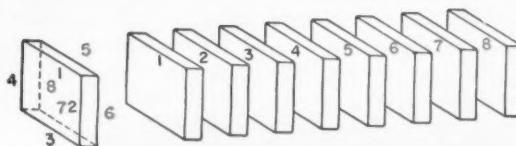


reduce the cost of

SURFACE BROACHING



C. H. Altbauer, Manager of Sales,
Special Machine Division, The Cincinnati
Milling Machine Co., holds
a wood model of a throw-away tool
bit as he demonstrates how throw-
aways present eight cutting edges
for broaching. (Patent pending)



- COMPLETELY AUTOMATED PRODUCTION LINES

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August, 1961

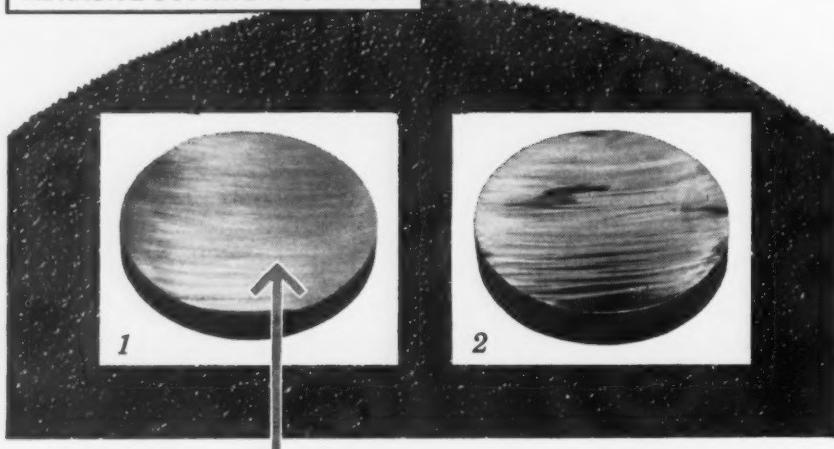
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Allison-Campbell

ABRASIVE CUTTING KNOW-HOW

Close-up view of resinoid wheel shows rough texture that provides cooler, cleaner cutting

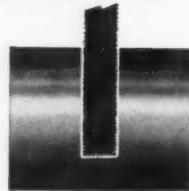


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3 Inside the cut,
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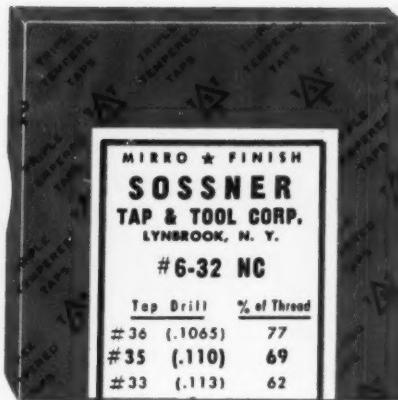
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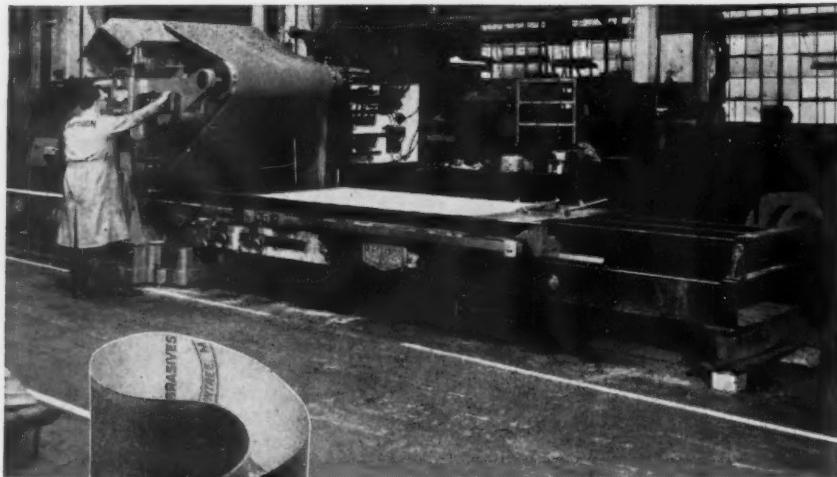
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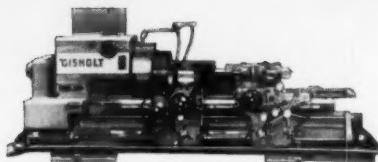
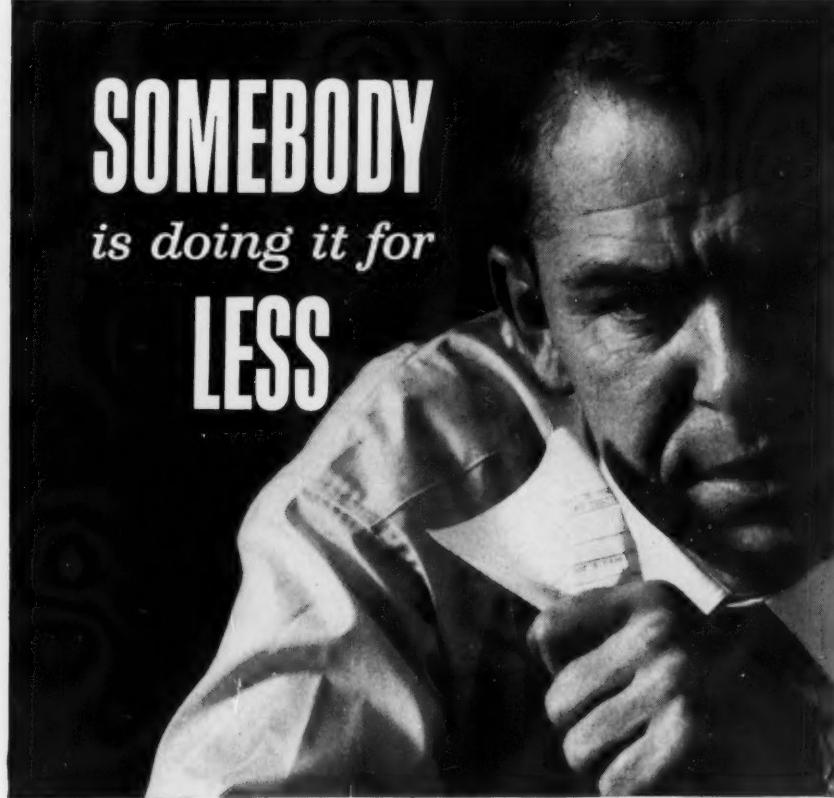
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August, 1961

How long could you stay in business if half your employees spent over three hours a day on coffee breaks? Your machine tools may be wasting that much time!

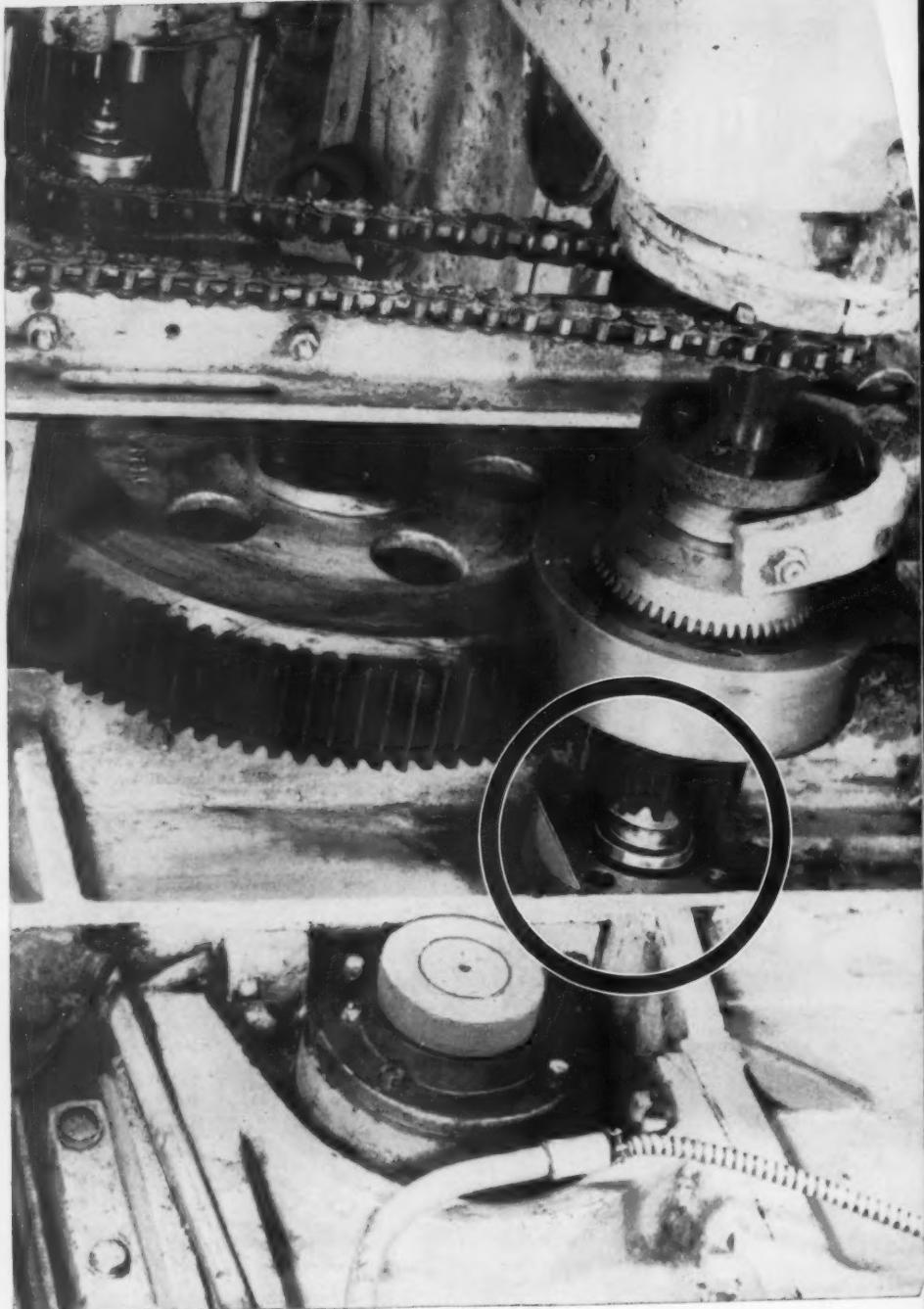
Farfetched? A new machine is at least 40% more efficient than its 10-year-old counterpart.

Your savings would include reduced machining times, reject rates, floor space, maintenance costs, tooling, lubricants, power, and skilled labor requirements.

Act now! Find out how Gisholt MASTERLINE Machines can help you do it for less.



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the Landis line of precision surface grinders

Look beyond "first-cost" in buying broaching tools



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It doesn't pay to take chances when buying broaching tools. Original cost of the broaching tools can be actually a minor factor in determining machining cost per piece.

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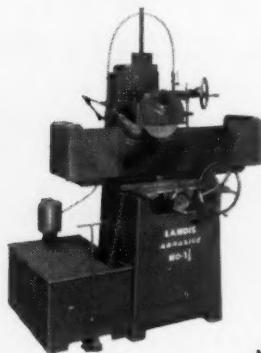
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DIVISION OF SUNDSTRAND CORPORATION

ANN ARBOR, MICHIGAN

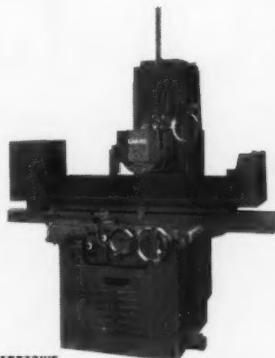
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the Landis line of precision surface grinders first for accuracy...first for value



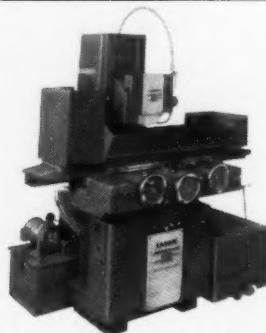
No. 1½

The most popular surface grinder for tool and die work. Hand operated with a 12" wheel for deep slot grinding, 1 hp motor and 10" x 15" worktable capacity. Shown with wet grinding attachment.



HYDRABRASIVE

Available in four sizes with 12" wheel and 3 hp motor, this hydraulic surface grinder is especially suited for general machine shops, production operations and tool shops.



No. 618

New 618 hydraulic surface grinder with power traverse, power crossfeed and power elevation to the wheel. Has 6" x 18" worktable capacity with 7" wheel and 1 hp motor or 12" wheel and 2 hp motor. Also available as hand operated machine.



18" FACE GRINDER

New hydraulic 18" face grinder for grinding workpieces requiring flat surfaces. Has 12" x 36" worktable capacity, 18" wheel and 15 hp motor. Also available as hand operated machine.

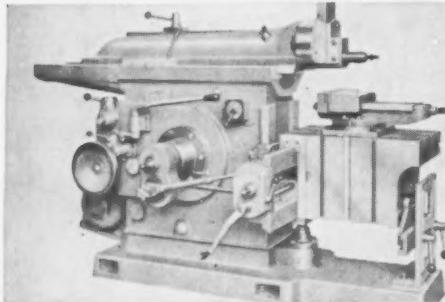
LANDIS
precision surface grinders

LANDIS TOOL COMPANY, WAYNESBORO, PA.

NEW 1961

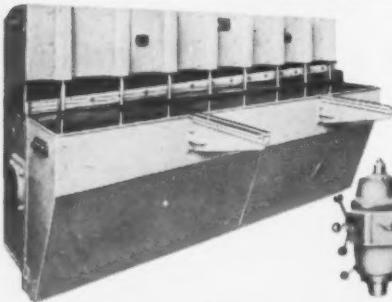
FOR 1961

EXTRAORDINARY
PRECISION & QUALITY
INCOMPARABLE
BEST VALUES IN U. S. A.



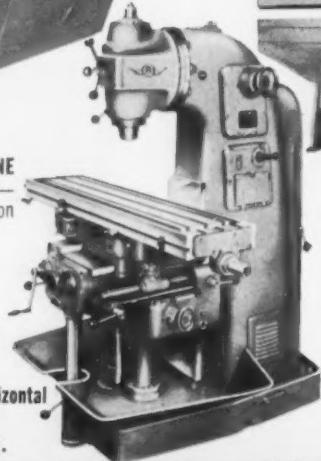
**EXCELSIOR Single Pulley
SHAPER Model 625**
FORCED FEED LUBRICATION
SWIVELING TABLE

Stroke of ram	19 $\frac{1}{16}$ "
Cross adjustment of table	25 $\frac{5}{16}$ "
Vertical adjustment of table	14 $\frac{1}{4}$ "
Surface of table	19" x 14 $\frac{1}{4}$ "
Number of strokes per minute	20-45-85-110
Motor power	2 H.P.

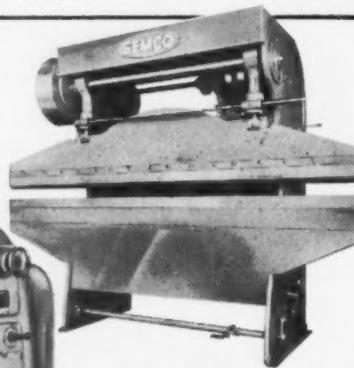


**IMPERIAL WIEGER GUILLOTINE
SHEARS**—All Steel Construction—
Single Stroke Control. 8" gaps on
all models.

From 6', 14 gauge \$2384.00
To 12', 1/4 gauge \$12,200.00



**PEDERSEN Vertical and Horizontal
MILLING MACHINES**
10 Models from \$1785.



SEMCO PRESS BRAKES
6" and 8" models, 12 and 14
gauge to 35 tons.
Solid one piece lower bed.
Extra large shut height 12 $\frac{1}{2}$ "
full, ball roller bearings.
From \$3995.

AARON MACHINERY CO., Inc.

45 CROSBY ST., N. Y. 12 • WA 5-8300

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TRAVATROL

electronic

POSITIONING CONTROL

REPLACES DOGS



A LINEAR measuring and positioning control that eliminates the use of "dogs" on reciprocating machine beds, and traversing work heads.

A complete packaged unit with variable speed D. C. motor drive and three dimensional position systems.

Available in a wide range of models.

TRAVATROL eliminates costly set-up time; it establishes and maintains a minimum distance of travel and point to point positioning over full range.

Dual adjustments are provided for minimum and maximum travel range.



Write, wire or
phone for additional
information

ELECTRO-MATIC PRODUCTS CO.

2235-7 N. KNOX AVENUE

CHICAGO 39

BE 5-4010

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SEIBERT IMPROVED

**SPINDLE EQUIPMENT
INCREASES MACHINE ACCURACY
AND PROVIDES GREATER
FLEXIBILITY**

When a machine is equipped with Seibert Improved Spindles, its accuracy and versatility are enhanced and its useful life increased. These advantages provide savings in production time and down time. Reasons are numerous but can be summed up briefly: good design, fine materials, accurate construction, and a complete spindle service. And beyond these, reasonable prices, which mean immediate savings.

Tell us your requirements and learn how Seibert Spindle Equipment can make your operations more profitable.

SEIBERT & SONS, INC.

1001 E. 24TH STREET • CHENOA, ILLINOIS

QUALITY MULTIPLE DRILL SPINDLE AND PRODUCTION TOOLS
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They "Go Together" For

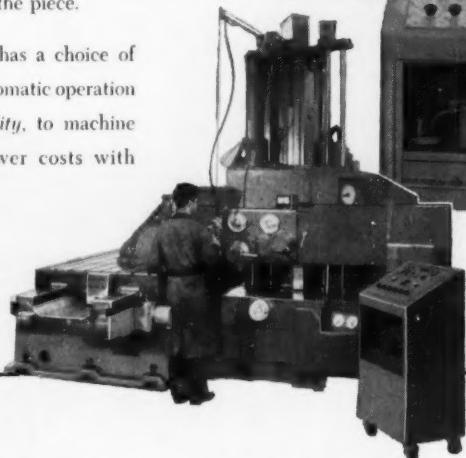
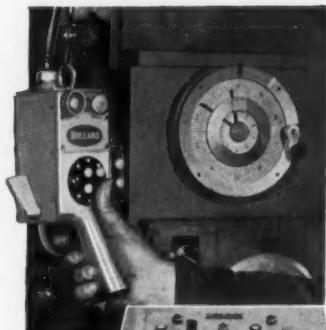
CENTRALIZED POWER CONTROL for manual operation and NUMERICAL TAPE CONTROL for automatic operation provide complete versatility of the Bullard DYNAMILL H.B.M. to insure maximum production.

Complete Versatility

With Centralized Power Control, the operator, from his normal position can actuate all functions of the machine and "power" position the head, table, saddle, and spindle to the work without hand cranks or levers.

When the work dictates that Tape Control should be employed, the operator merely "zeros" the machine according to the pre-punched tape for machining the piece.

Thus, the operator has a choice of either manual or automatic operation — *complete versatility*, to machine more pieces at lower costs with increased profits.



For Complete Information on the Bullard DYNAMILL H.B.M., call your nearest Bullard Sales Office or Distributor or write The Bullard Company, Bridgeport 9, Connecticut.
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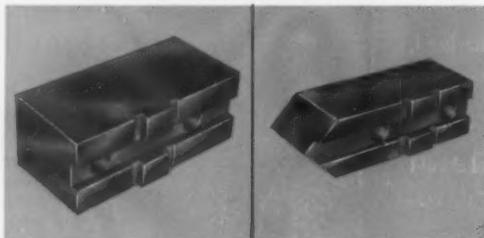
**Now... A COMPLETE LINE OF SKINNER
SOFT BLANK TOP JAWS
AVAILABLE FROM NEARBY DISTRIBUTOR STOCKS**
...all manufactured to American Standard dimensions



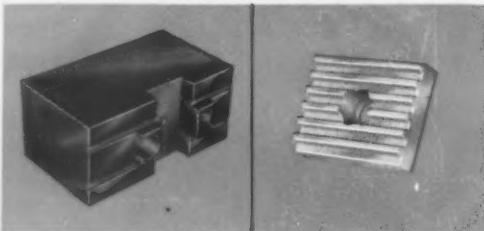
- Save time and tool costs
- Furnished in distinctive black
- Cost less to buy than to make yourself

Now you can save time, money and delays by selecting from Skinner's complete line of Soft Blank Top Jaws for all chucks made to American Standard dimensions. Take advantage of fast, one-source service at your nearest distributor. His stocks are complete in all sizes and shapes. Call him today!

TONGUE AND GROOVE TYPE



SERRATED JAW TYPE and Master Keys



Serrated Master Keys: Precision-machined from top quality, hardened steel. Serrations are so machined that by reversing master key 180°, the top jaw can be adjusted to ½ the pitch of the serrations. This feature permits easy adjustment of the top jaws in reference to the work.

MEDIUM DUTY—For Self-Centering Scroll Chucks, Independent Chucks and Combination Scroll Chucks.

HEAVY DUTY—For Power, Independent and Self-Centering Scroll Chucks.

These jaws can be used as supplied or shaped to meet specific requirements. Made from low carbon steel which can be easily carburized and hardened. Extra-high heavy duty top jaws are also available. The Long Pointed Jaws are designed so that points meet at center of work, permitting full use of chuck capacity.

For Heavy Duty Power and Scroll Chucks
These jaws also can be used as supplied or shaped to meet specific requirements. They are processed to resist rust and can be easily shaped, carburized and hardened. Screw is supplied when jaw and corresponding key are purchased together—permitting key and jaw to be stored assembled as a matched set.

**HEAT TREATING INSTRUCTIONS INCLUDED
WITH ALL BLANK JAWS**

Ask your distributor for folder showing complete range of sizes and shapes or write to the address below, Department 178.



SKINNERCHUCKS

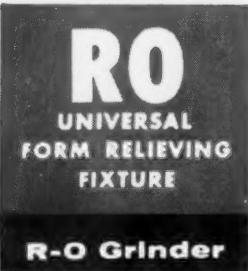
SKINNER-HORTON CHUCK DIVISION

SKINNER PRECISION INDUSTRIES, INC. • NEW BRITAIN, CONNECTICUT, U.S.A.
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problems —other people's!



These are some of the actual tools and work pieces that have been submitted to us as problem jobs. The actuation and compound adjustments which are provided in R-O equipment make it possible to handle grinding situations that cannot be performed economically, or at all, on other equipment. Our sales engineers will be glad to review your unusual relieving problems with you.



R-O Manufacturing Company
31171 Stephenson Highway
Madison Heights, Michigan

Please forward the R-O catalog

Firm.....

Address.....

City..... Zone..... State.....

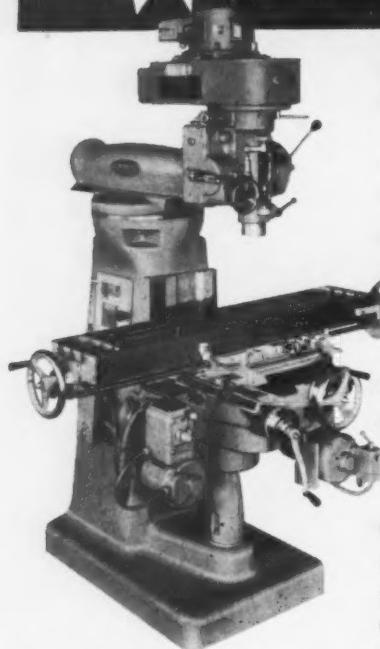
Per.....

Title.....

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NEW

"645" BETTER SIX WAYS



• GREATER RANGE—

In EVERY category than ANY machine in its class • 25½" of ram travel • Spindle to table and spindle to column—Range greatly exceeds competitive machines, PLUS many other dimension advantages.

• GREATER ACCURACY—

Ground lead screws • Hand scraped ways • Overarm stays in one plane • Locks without distortion • tool room accuracy in manufacture of components.

• GREATER VERSATILITY—

Head tilts 45° forward and back, rotates 360° on ram • Turret rotates 360° on column • Power assembly rotates 360° around spindle • Many other features.

• GREATER EFFICIENCY—

Convenient controls • 9 spindle speeds, 3 power spindle feeds (up or down) • 4-way head handles any compound work angle • Greater work area.

• GREATER DURABILITY—

Index quality throughout for long trouble-free life.

• PROVEN ACCESSORIES AND EXTRA EQUIPMENT—

Ask for catalog and prices.

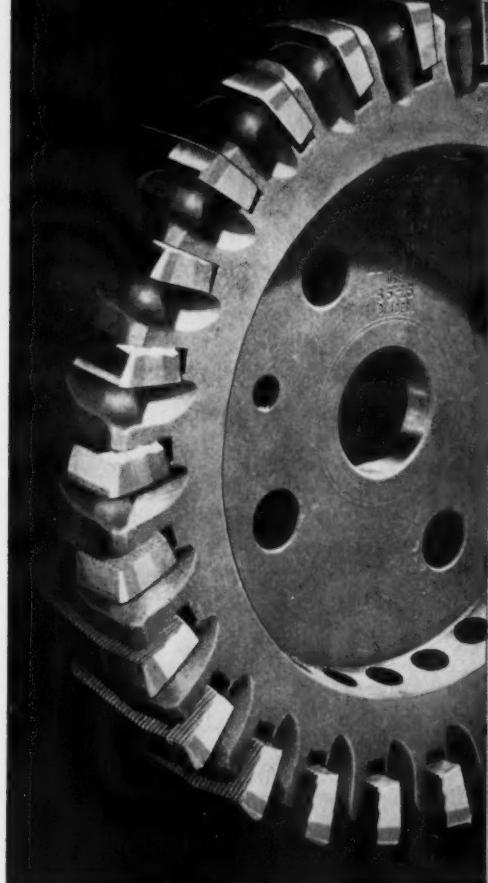
WRITE FOR YOUR COPIES OF 4-PAGE DESCRIPTIVE BROCHURES PACKED WITH FACTS ON NEW MODEL "645" HEAVY DUTY "55" VERTICAL MILL AND MODEL "60" HORIZONTAL MILL.

INDEX

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MACHINE COMPANY
544 N. MECHANIC ST.
PHONE ST 2-6737
JACKSON, MICHIGAN

longer blade life with *dual adjustment*



a big advancement in milling cutter design

Two angles govern the location of blades in a cutter: the axial and the radial rakes. On the *inside conical type*, blades moved out one serration advance on a ratio of 4 to 1. Blades move four times more on the face than on the periphery. On the *outside conical type*, the order is reversed, 1 to 4. Thus, the major blade adjustment is made in the direction of the greatest wear, on the periphery or on the face, depending upon the operation.

This dual adjustment feature is a simple device that makes available a greater proportion of the cutting blade material for regrinds whether it is carbide, super high speed steel or cast alloys. In this way you conserve expensive blade stock, an item that no manufacturer can afford to waste. With dual adjustable cutters you get as many as ten extra grinds with good grinding practice. Write for Catalog 13.

The O K Tool Company,
800 Elm Street, Milford,
Inc.,
N.H.



modern milling cutters for



modern



milling machines

For more data circle 333 on Postpaid Card

LOW COST



DRILL HEAD

**THIS BULLETIN GIVES
ALL NEEDED DATA**



Write for it today. Address
Dept. MMS-861, Bellows-
Valvair, Akron 9, Ohio. Ask
for Bulletin BL-22.

Ideal for low-cost shop-built machines for working soft metals, wood or plastics. 3/16" drill capacity in mild steel. Adjustable 2" stroke. Choice of either 8,000 or 12,000 RPM spindle speeds. Air powered traverse. (Can be equipped with a Bellows Hydro-Check for hydraulic feed control.) Sold less valve. Can be controlled with Bellows low-voltage Electroaire Valve or any 4-way directional valve. Pulley driven. 1/3 hp electric motor recommended. Basic unit weighs only 13-1/2 lbs. Mounts in any position. Overall size 2-1/2" x 3-5/8" x 12-3/16".

The low cost of these Bellows-Locke Model 22-A Drill Units makes it well worth while to keep a half dozen or so in the tool room instantly available for quick assembly into special-purpose drilling machines. Their cost can often be absorbed in one production run.

657C-3

Bellows-Valvair
AKRON 9, OHIO
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

For more data circle 334 on Postpaid Card



**any hardened
Way
you can
design**

THE OHIO KNIFE CO. CAN MAKE

BETTER — our time proven process of bonding special analysis tool steel to tough machineable steel, then hardening the tool steel (65-66 Rockwell C) along entire length, enables us to give you hardened surfaces anywhere you want them.

FASTER — we make hundreds of these special shapes for every conceivable application—our new production methods are geared to meet fast delivery requirements.

LOWER-IN-PRICE — no one is as completely set-up — design, engineering, heat treating and production—to deliver these special ways to you at a price far below what it would cost you to make them yourself.

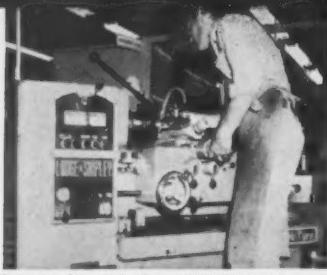
IMPORTANT — we carry in hardened stock 12 standard way shapes in 88 sizes, with delivery from stock to 5 weeks.

For FREE Bulletin-A, describing O-KNI-CO hardened ways, wear plates, etc., write Dept. 122-HH.

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO

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Dalmotor Div., Yuba Consolidated Industries . . . "used in model shop for turning, facing and boring all sorts of experimental parts."



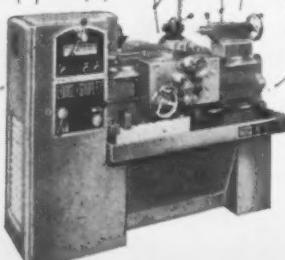
Raytheon Manufacturing Co. . . . "used for turning, facing and boring operations on brass, aluminum and steel workpieces."

Over an extremely wide range of American industry . . . for tooling, production, maintenance and experimentation . . . the Lodge & Shipley 1307 HI-TURN (10") Lathe is making a record of true economy. With literally dozens of big lathe features, the HI-TURN is still priced substantially below many lathes having fewer features, less horsepower and lighter construction.

Turn your attention to HI-TURN. Find out why these and many other lathe users are ordering and reordering HI-TURN Production and Tracer Lathes to replace or supplement larger, far more costly lathes. For complete details, request Bulletin 331, The Lodge & Shipley Co., 3058 Colerain Ave., Cincinnati 25, Ohio.

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THEY'RE ALL TURNING TO **Hi-Turn**



. . . your *Lodge-ical* choice

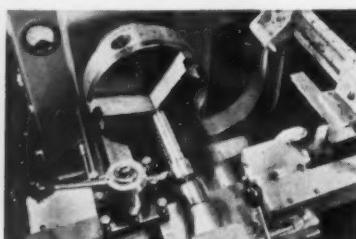
Lodge & Shipley



Rocketdyne Div., North American Aviation . . . "held OD turning to a tolerance of .0003"."



Leading glass manufacturer . . . "unheard of economy, ease and speed of production" on machining and reworking glass bottle tooling.



Indiana Gear Works . . . has earned a reputation of "excellent for high production."

TIME SAVINGS

UP
TO **50%**!

in working

Metals • Wood

Glass

Fiberglass

Laminated
Materials

Some Plastics



BURR, CLEAN, FINISH, POLISH in one operation
with revolutionary, abrasive-and-rubber **BRIGHTBOY**

REPLACES OLDER, COSTLIER METHODS

COUNTLESS CASE HISTORIES attest to the exceptional success of Brightboy's unique working action. You have to see it to believe it—abrasive and rubber functioning simultaneously, speedily.

JOB-MATCHED STOCK ITEMS in wheels, sticks, rods, blocks and points, are specifically suited to your production. Wide range of Silicon Carbide and Aluminum Oxide textures—extra fine to extra coarse—in soft, semi-firm, firm and tough rubber binders, for machine and manual operations. The only complete, comprehensive line of soft rubber bonded abrasives.

LEARN THE REVEALING FACTS ▶

about this broad, new concept of abrasive applications and versatility. Write for the Brightboy Catalog-Manual covering Methods and Applications, Machine Speeds, Job-Matched Stock Items, Wheel Sizes—Complete Range.



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.

95 North 13th Street • Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

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"held OD turning to a tolerance of .0003."

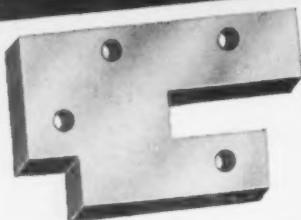
or production" on machining and reworking glass bottle tooling.

MACHINE TOOL

MARKING TOOL

ENGRAVOGRAPH is both!

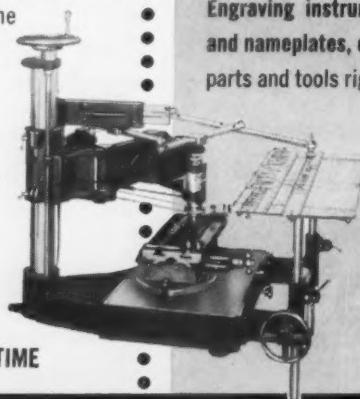
"The skill is in the tool, not on your payroll"



Vertical Milling...Profiling...Slotting...Drilling: With Engravograph, this shape was profiled and the holes were spotted and drilled in one set-up, from one master template, eliminating expensive tooling, multiple operations on costly equipment.

MAKE IT IN A
FRACTION OF
THE TIME

Write on your letterhead
for 28-page catalog FM-B



• 213B •

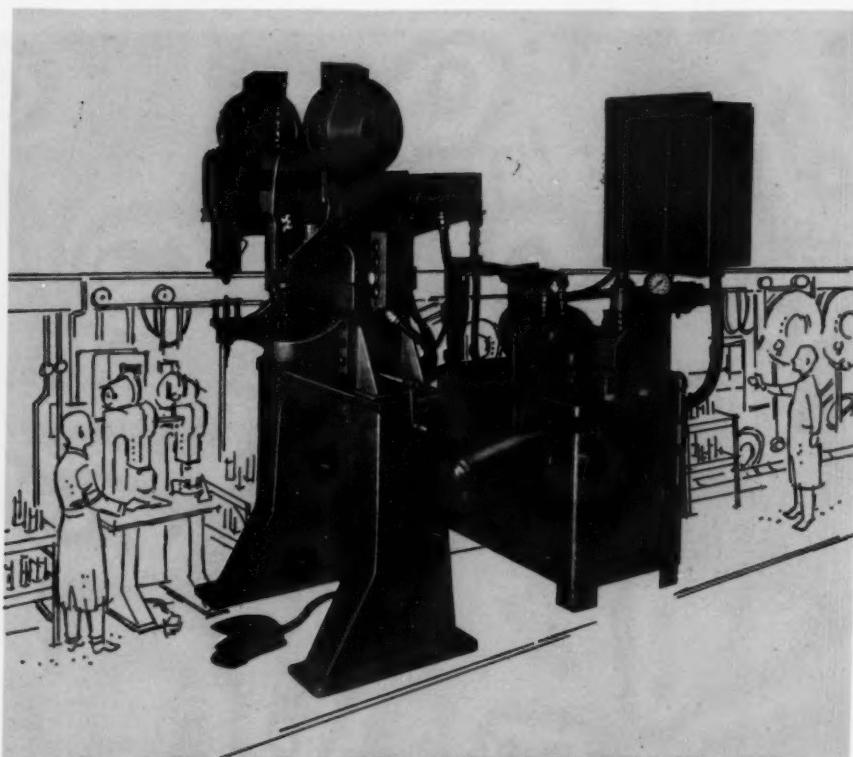
Engraving instrument panels, legend and nameplates, dials, and marking all parts and tools right in your own shop.

MAKE IT WHEN
YOU NEED IT

new hermes

ENGRAVING MACHINE CORP. 154 WEST 14TH STREET NEW YORK 11, N.Y.
IN CANADA 359 St. James Street West, Montreal, P.Q.

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A T-J RIVITOR

on your production line
means higher production rate . . . lower unit cost!

T-J Rivitors and Clinchers are designed, engineered and manufactured to conform and operate efficiently on today's high-speed production lines. For whatever your product . . . if it demands a fastening assembly procedure . . . a T-J riveting or clinching machine adds to its high quality standards by their ability

in providing long, rugged service-free life.

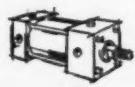
Many standard designs to choose from . . . or a T-J can be custom designed for your exact requirements. Write Tomkins-Johnson, 2425 W. Michigan Ave., Jackson, Mich., today. Ask for Rivitor and Clinchor Bulletin No. 646 or Clinchor Bulletin No. 555.



RIVITORS



CLINCHORS



CYLINDERS



CUTTING TOOLS



TOMKINS-JOHNSON

JACKSON, MICHIGAN

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Turn your parts profitably

For turning complex contoured parts, in job lot quantities, Tape-Turn will show you rock-bottom costs! Its continuous path Mark Century tape control puts engineering data at the cutting edge far more efficiently than any manual or tracer turning method.

Because LeBlond pioneered continuous-path turning with tape, you'll benefit by many months of experience. We can show you actual applications on production runs. Our skilled programming staff will help your engineers learn the simple routines involved in tape turning.

Simple programming is a major feature of LeBlond Tape-Turn. The General Electric Mark

Century control has a built-in computer which saves the programmer time in setting up for straight cuts, tapers, arcs and blended combinations of these. For the most complex shapes, separate computer assistance is desirable. You can learn the Tape-Turn programming procedure in half a day!

Increased efficiency, reduced lead time, a permanent record in easily stored form, low-cost quality control, reduced parts inventory, shorter set-up time and lower tooling costs—plus all the reliability and precision of a LeBlond Heavy-Duty Lathe—these are yours with LeBlond Tape-Turn. Write for descriptive bulletin TWC.

Look at these savings!



This cluster gear blank, used in a jet engine, is machined in lots of 100. Formerly turned on a production copy lathe, total time—including template preparation and set up—was 2950 minutes. On Tape-Turn, total time is 992 minutes, including programming, tape preparation and set-up.

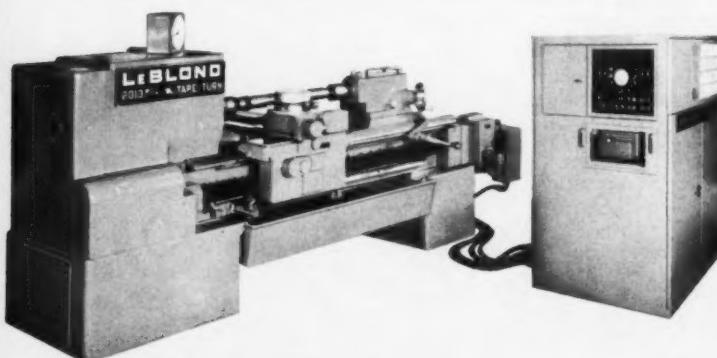
Savings—66.3%!



In lot size of just six, this contoured shaft was machined on a tracer lathe in a total of 1763.7 minutes. This includes time for preparation of the template and set-up. LeBlond Tape-Turn slashes the total to 759.6 minutes, counting programming, tape preparation and set-up.

Savings—57.7%!

-on LeBlond Tape-Turn



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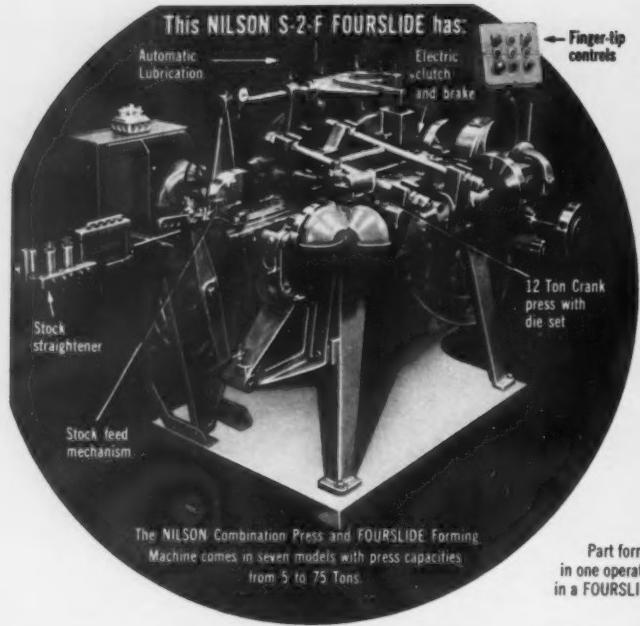
In production, now.

Eight Heavy-Duty Models: 2013, 2516 and 2516-20 NE, 20 hp. 2516, 3220 and 3220-25 NF, up to 50 hp. 4025 and 4025-32, up to 75 hp.

*"Leading the way
in numerically
controlled turning"*



The R. K. LeBlond Machine Tool Company
Cincinnati 8, Ohio



Competitive Pressrooms Can Produce and Earn More—with a Nilson FOURSIDE

The NILSON machine, which combines a crank or toggle press with FOURSLIDE forming motions, produces complex stampings in one operation. Standard NILSON FOURSIDES incorporate built-in stock straightening and feeding mechanisms, together with cam-actuated horizontal and vertical motions, providing many production advantages:

- Eliminate expensive camming and tooling
- Reduce material costs—no carrier for metal strip
- High production rates—up to 200 parts/minute
- Quick-change cams for fast changeover
- Utilizes lower cost adjustable form tools and dies for multiple sizes
- Automatic scrap disposal in the horizontal press
- Additional motions readily available from four camshafts
- Also handles wire forms requiring press operations
- Forms wide range of part sizes—up to 4" wide; 16" long
- Forms on two levels, and minimizes stripping problems



NILSON

Full explanation of the NILSON FOURSIDE PROCESS is available in the "FOURSIDE Design & Tooling Handbook", which is yours for the asking.



THE A. H. NILSON MACHINE CO. • 627 Bridgeport Avenue • Shelton, Conn.

For more data circle 341 on Postpaid Card

THIS CINCINNATI®

shears heavy plate

Paragon Bridge & Steel Co., Novi, Mich., cuts costs as it cuts heavy plate with this Cincinnati Shear:

Operators cut production time with rapid, easy gaging and adjustment; no need for changing knife clearance to cut different thicknesses of metal.

The Cincinnati Shear also permits square shearing, notching, and slitting operations.

This machine can trim an edge to one-half the thickness of a sheet or plate. Furthermore, longer knife life is obtained from extra-size, four-edge knives.

Whether you're considering a mechanical or hydraulic shear, the broad Cincinnati line offers you maximum advantages for your plate shearing requirements. Write for your copy of a Cincinnati Shear catalog.

Shapers / Shears / Press Brakes

THE CINCINNATI

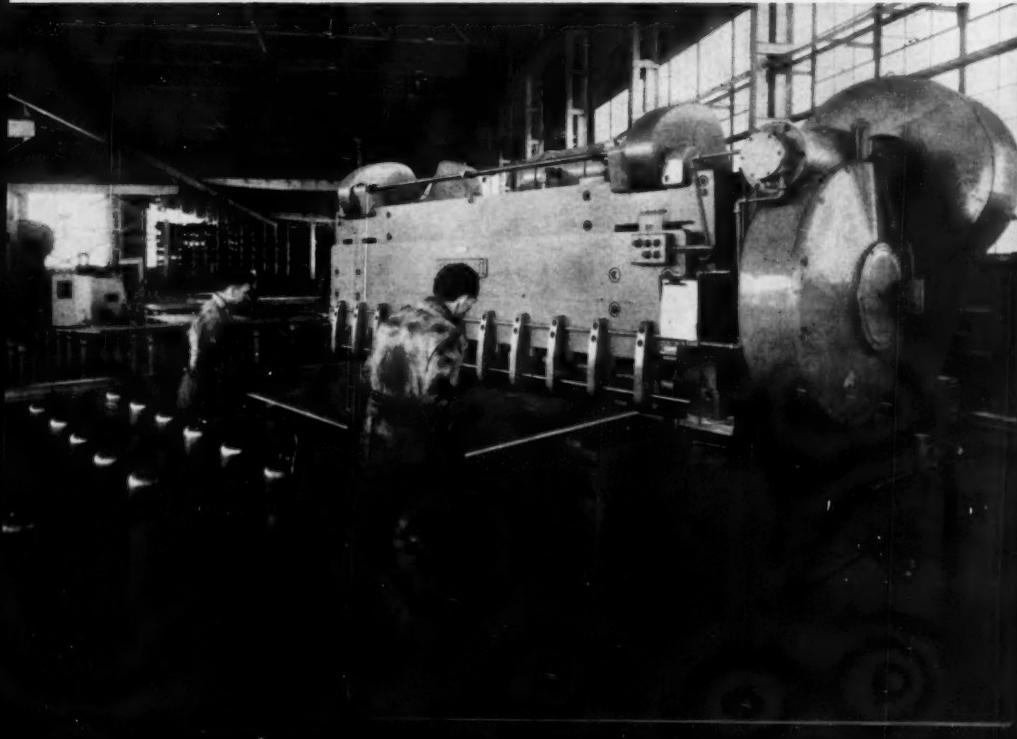
 SHAPER co.

Cincinnati 11, Ohio, U.S.A.

United Kingdom: The Cincinnati Shaper Co., Ltd., Glasgow, Scotland

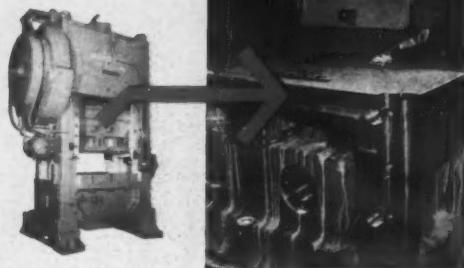
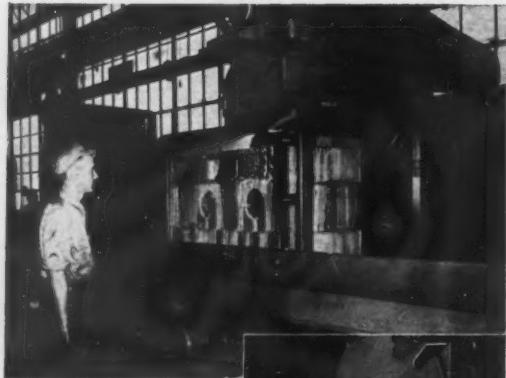
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Courtesy Paragon Bridge & Steel Co., Novi, Mich.



SIZE FOR SIZE

there are no
heavier or more
accurate surface
grinders made than
these fast, heavy
duty Thompsons

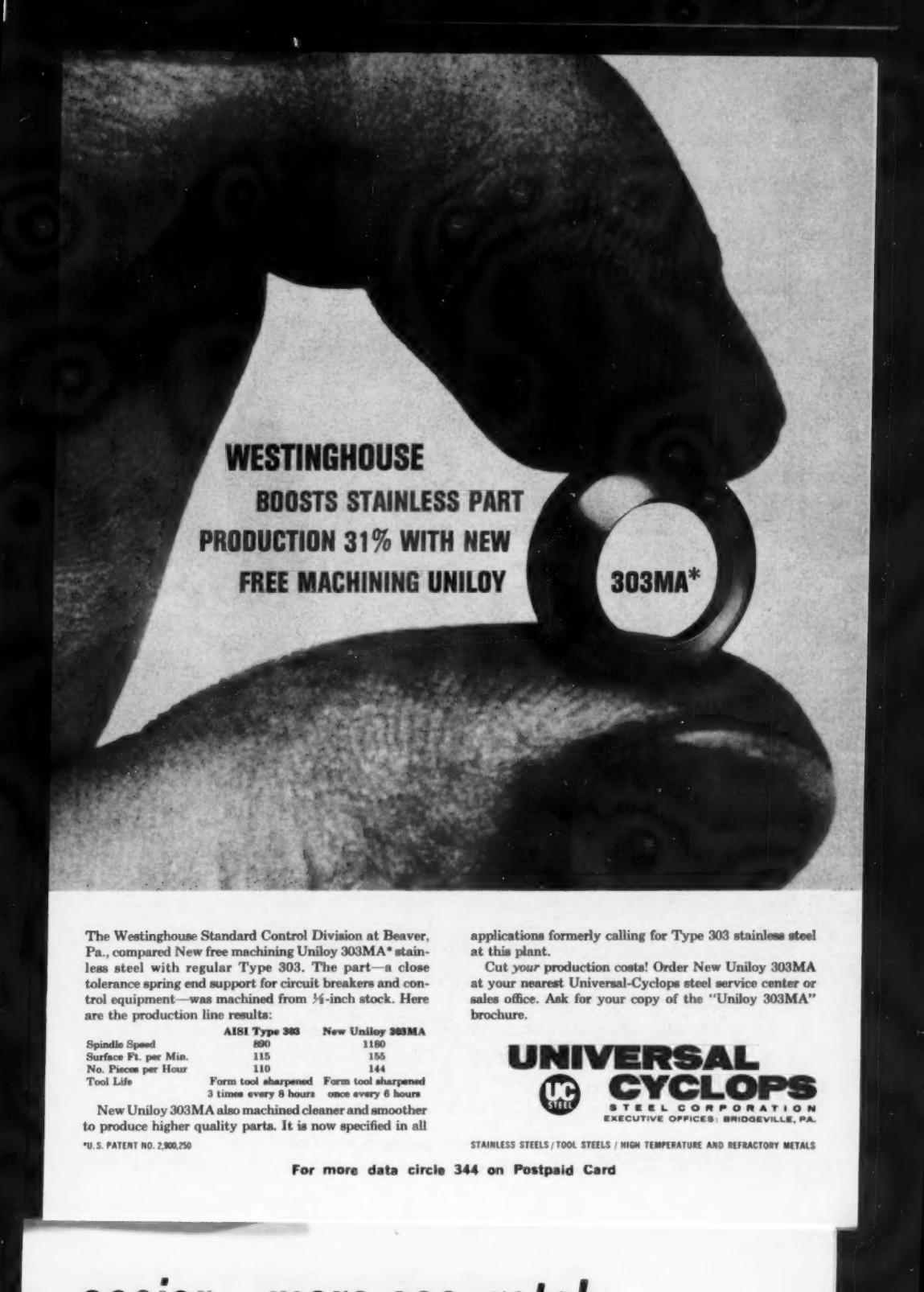


THE THOMPSON GRINDER CO., Springfield, Ohio



"Keep *Thompson* in mind for that daily grind"

For more data circle 343 on Postpaid Card



WESTINGHOUSE BOOSTS STAINLESS PART PRODUCTION 31% WITH NEW FREE MACHINING UNILOY

The Westinghouse Standard Control Division at Beaver, Pa., compared New free machining Uniloy 303MA* stainless steel with regular Type 303. The part—a close tolerance spring end support for circuit breakers and control equipment—was machined from $\frac{3}{8}$ -inch stock. Here are the production line results:

	AISI Type 303	New Uniloy 303MA
Spindle Speed	890	1180
Surface Ft. per Min.	115	155
No. Passes per Hour	110	144
Tool Life	Form tool sharpened 3 times every 8 hours	Form tool sharpened once every 6 hours

New Uniloy 303MA also machined cleaner and smoother to produce higher quality parts. It is now specified in all

*U. S. PATENT NO. 2,900,250

applications formerly calling for Type 303 stainless steel at this plant.

Cut your production costs! Order New Uniloy 303MA at your nearest Universal-Cyclops steel service center or sales office. Ask for your copy of the "Uniloy 303MA" brochure.

**UNIVERSAL
CYCLOPS**

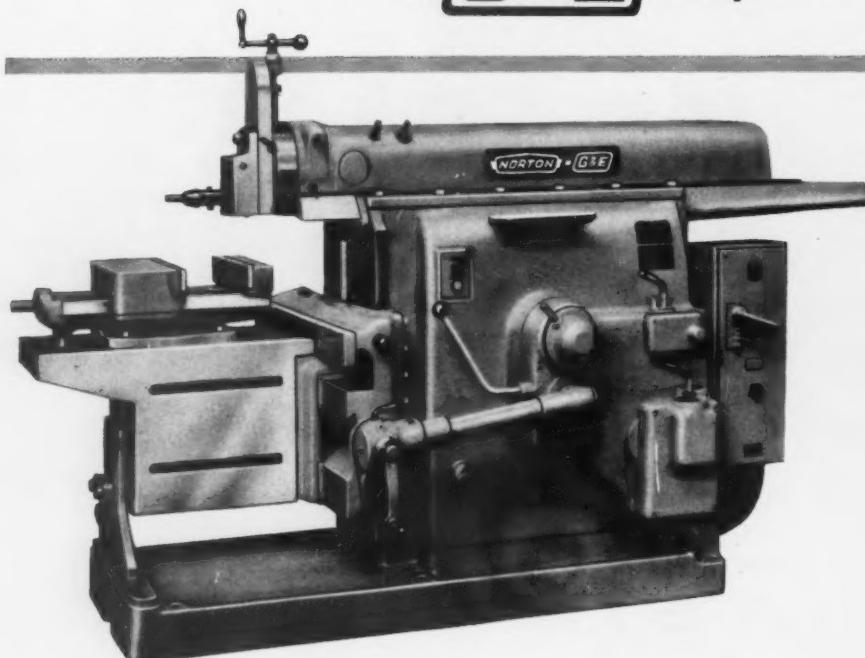
STEEL CORPORATION
EXECUTIVE OFFICES: BRIDGEVILLE, PA.

STAINLESS STEELS / TOOL STEELS / HIGH TEMPERATURE AND REFRactory METALS

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Things shape up better...

on **G & E** Shapers...



Reasons why include their proved accuracy and exceptional ease of operation — developed during G & E's century of success in improving shaper design to keep pace with increasing demands.

As a result, the present complete line of G & E Shapers supplies the best answers to many of today's metalworking problems.

G & E 16" Tool Room Shapers and 14" and 16" Plain Tool Room Shapers are designed for light

tool and die and other small work. For heavy work G & E Industrial Shapers are built in 16" to 36" stroke sizes. To handle a wide variety of shaper work, G & E Universal Shapers with tilting tables are available in 14" to 36" stroke sizes.

Your G & E distributor will be glad to give you more facts about Shapers and other G & E machines. Or write to NORTON COMPANY, G & E Division, Worcester 6, Massachusetts.

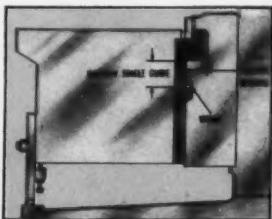
NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — DERR MACHINING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

easier...more accurately with features like these...

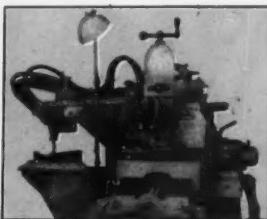
Lasting accuracy!



Hard chrome ram V-ways maintain accuracy; resist wear and abrasion. Unre-touched photo of chromed ways with gib removed shows excellent condition of ways after 15 years of continuous service.



Improved crossrail and table slide is an exclusive G & E development for improved accuracy that provides 60% more bearing area and 50% greater rigidity.



The hydraulic follower attachment can make a single G & E Shaper virtually two machines in one; reproduces complex shapes accurately; often eliminates hand finishing, and cuts production costs.

Easy operation!



Two convenient controls assure quick, easy selection of the 16 ram speeds — provided by double crank-gear transmission employing all-helical gears.



A single-cam feed mechanism enables quick changes throughout the 18-feed range while the Shaper is in operation. A special fine-feed range is available with Industrial Shapers.



Power downfeed with positive depth stop automatically feeds tool on return stroke of ram. Eight feeds, clearly indicated on direct-reading dial, are easily selected by single lever control.

Other G & E advancements include: Built-in horizontal and vertical rapid traverse to work table, with safety clutch, always operates in opposite direction to feed set . . . positive-lock table support prevents disturbance of table alignment . . . Universal Shaper tilting tables have trunnion integral with cross slide, metal-to-metal clamp in table, and all controls operated from front.

NORTON
MACHINE TOOLS

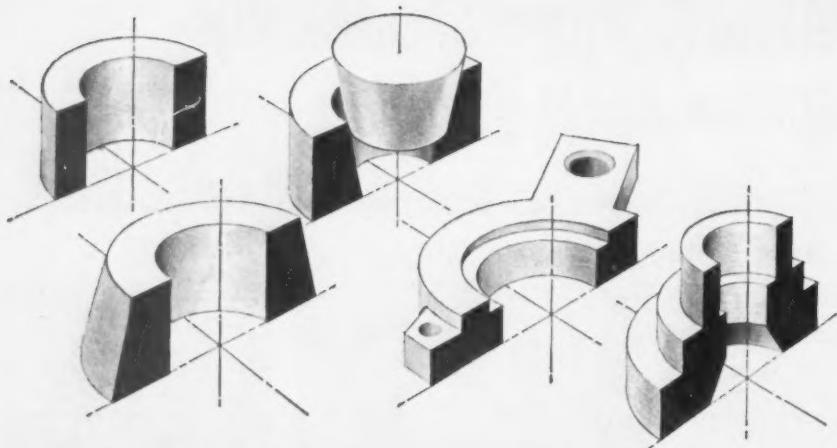
Making better products . . .
to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — G & E DIVISION: Shapers • Gear Cutting Machines

For more data circle 345 on Postpaid Card

August, 1961

MODERN MACHINE SHOP 41



when to consider Vertical Grinding

A simple test you can try for yourself quickly determines whether you should consider the Springfield principle of vertical grinding. Try it!

CHECK YOUR ANSWERS TO THIS QUIZ

1. Do you grind holes 4" in diameter and larger?
2. Do you grind taper holes or mating parts?
3. Do you grind on irregular shaped work?
4. Do you grind O.D. or I.D. shoulders, offsets, undercuts?
5. Do you grind pieces requiring extreme concentricity?
6. Do you require a 5 micro-inch or better finish?
7. Do some of your grinding jobs require many setups?

If you answer yes to three or more questions, a Springfield vertical universal grinder probably can save real time and money in your plant. Mail the coupon today for your free and informative copy of "Vertical Universal Grinders"; Bulletin 197-F.

THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO



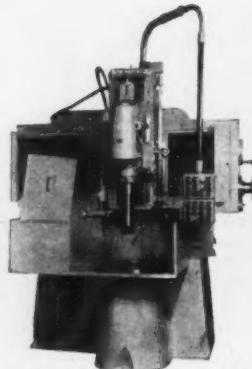
SPRINGFIELD

name & title _____

company _____

address _____

city, state, state _____



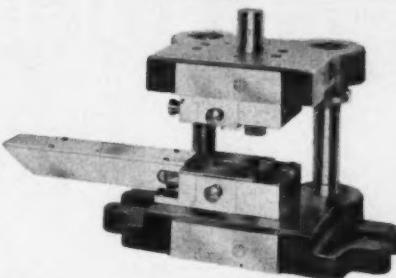
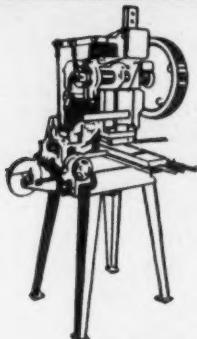
Above is a standard Springfield 2A-TR vertical universal grinder. It swings 25°; the grinding head has a 21" stroke and it grinds holes to a nominal depth of 18". The head can be tilted 45° in either direction. Electro-hydraulic control is standard with pendant pushbuttons. The Model 2A-TR costs less than most horizontal chucking grinders of comparable size; it can do the same work plus a wide variety of jobs that just can't be done on a horizontal. Gravity works for you in vertical grinding.

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STAMPED OR EMBOSSED

• TAG MAKERS •

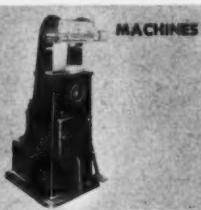
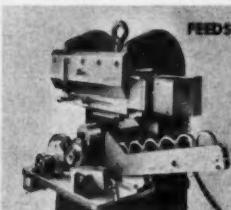


Make Your Own Complete Tags

- ① MARKS
- ② PIERCES
- ③ SHEARS

These Schmidt Tag Makers are built to produce your tags... embossed or stamped, any shape . . . any material . . . from coil stock. They automatically mark, pierce and shear tags in one operation. Steel type in drawer style chase permits quick changes of legend.

COMPLETE LINE OF MARKING EQUIPMENT



Single machines or entire automatic marking stations including machines, feeds and lettering tools—are engineered, designed and produced to meet your requirements.

Free consultation with a qualified marking engineer can be arranged promptly. Send today for Catalog No. 18.



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Since 1895

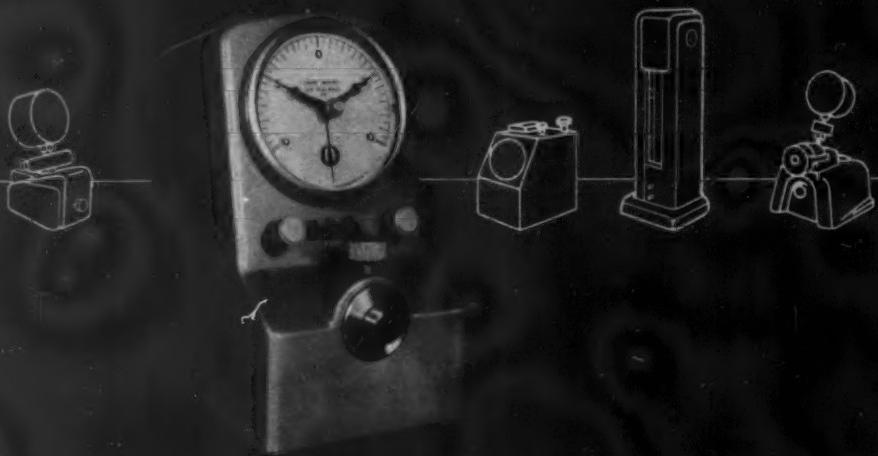
Engraved Marking Tools • Nameplate Marking Equipment
Embossing Dies • Special and General Purpose Marking Machines

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STANDARD'S AIR GAGES CAN REDUCE
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COMPARE IT FOR

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- MAINTENANCE
- EASY SET-UP
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ASK YOUR MAN FROM STANDARD OR WRITE TO:

STANDARD GAGE COMPANY, INC.

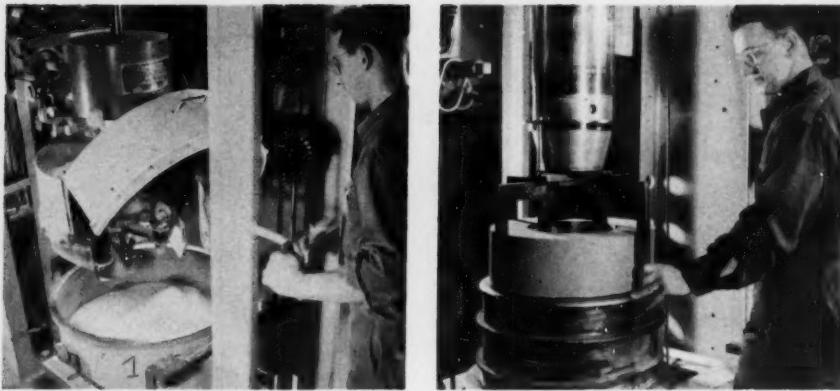
MANUFACTURERS OF MECHANICAL & AIR GAGING EQUIPMENT

POUGHKEEPSIE, N. Y.

TELEPHONE GROVER 1-3100

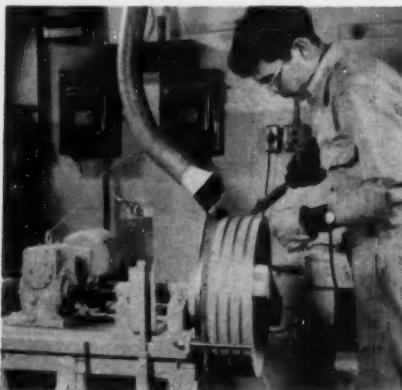
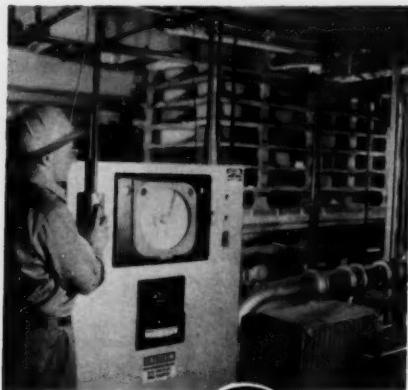
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WHAT "GOES INTO" A BLANCHARD WHEEL?

Quality . . . Care . . . Experience. That's the "formula" for Blanchard Wheels and Segments. Working with the finest raw materials obtainable, skilled technicians supervise every manufacturing step from batching to banding. And each operation is based on years of development work. It's your assurance of the *best* in silicate, resinoid, and vitrified bonded wheels and segments . . . the *best* for your Blanchard Surface Grinder. Check your Blanchard Representative. And send for: "The Art of Blanchard Surface Grinding" (4th printing).



PUT IT ON THE  **THE BLANCHARD MACHINE COMPANY**
64 State Street, Cambridge 39, Massachusetts

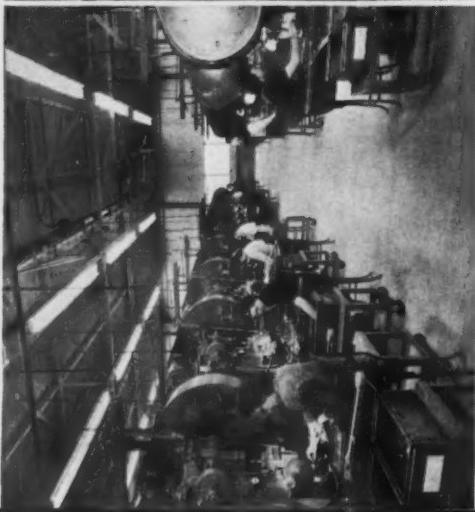
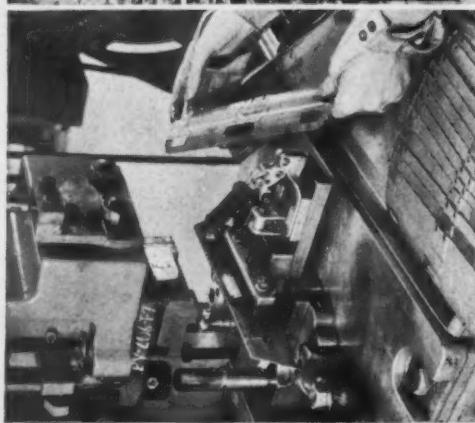
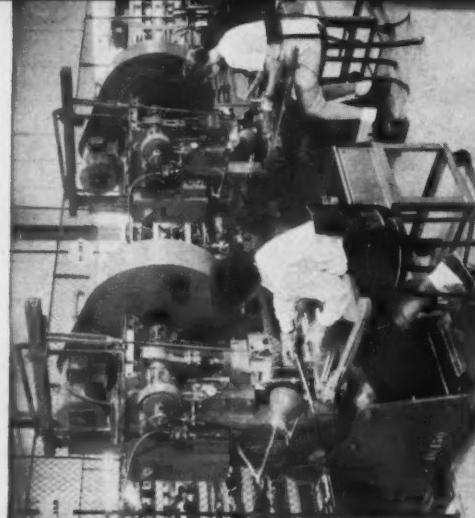
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August, 1961

MODERN MACHINE SHOP 45

39 OBI'S GIVE PRESS DOLLARS 3-WAY STRETCH

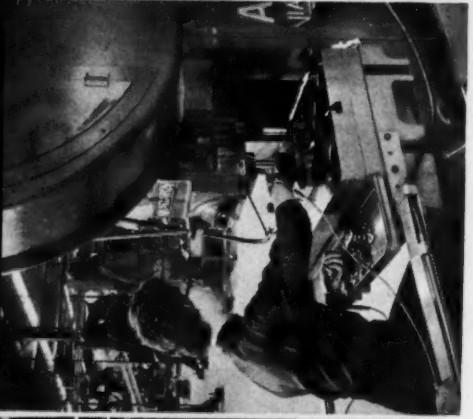
Newly installed Niagara Inclinables provide required precision at lower investment, produce more parts per hour, and cut maintenance to the bone



SERVING ONE OF THE WORLD'S LARGEST typewriter manufacturers in a brand-new plant, 39 new Niagara Series A Open Back Inclinables play a key role in the production of nearly 2000 precision parts for portable machines. With selection based on past experience, these presses are more than living up to expectations . . . performance-wise and dollar-wise.

.001" TOLERANCES ARE MAINTAINED as Niagara OBI's engage in a wide variety of piercing, notching, trimming, bending and intricate forming operations. Here, a hinge tab is given a final bend on a 22-ton Niagara Series A. Rigid press frames and short-coupled, multiple "V" gibs not only insure precise production, but lengthen die life.

BOOSTING PRODUCTION 30%, these fast-acting hand fed OBI's turn out an average of 1300 pieces an hour per machine. The reason: Instant clutch engagement and disengagement at every press stroke provide more working strokes per minute. Niagara's famed multi-point mechanical sleeve clutch picks up the load on 14 engaging jaws and applies driving force concentrically without keys or pins.



EVERYTHING HUMS ALONG SMOOTHLY day after day. Niagara OBI's are unmatched for dependability and safety. With fewer parts and simpler construction, there's less to go wrong... less to repair and replace. No complicated electrical circuits, limit switches or solenoids... no palm buttons, air valves or rotary connections.

MAINTENANCE IS SHAVED TO AN "ABSOLUTE MINIMUM," according to this Niagara user. Unlike other presses previously utilized, these Series A's do not require constant "doctoring." There's no need for frequent adjustment of the clutch sleeve and brake. No "dogs" to break off and require replacement. No press can match its economy.

WANT TO STRETCH YOUR PRESS DOLLARS, TOO? Write for illustrated Bulletin 58 containing the facts and figures on Niagara Series A Open Back Inclinable Presses (Built in 13 standard sizes with shaft diameters from $1\frac{1}{4}$ " to $6\frac{1}{2}$ " and capacities from $5\frac{1}{2}$ to 190 tons). Niagara Machine & Tool Works, Buffalo 11, N. Y., District Offices and Distributors Everywhere.

NIAGARA

OBI PRESSES

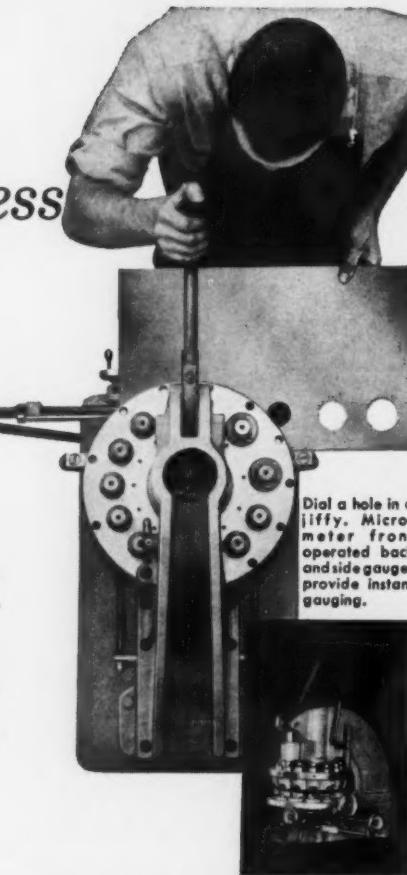
America's most complete line of presses, press brakes, shears, other machines and tools for plate and sheet metal work.
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new Di-Acro^{}* turret punch press

Accurate Burr-Free Punching at 12 Rotating Stations

The new Di-Acro 4 Ton Turret Punch Press provides rapid, close tolerance punching of round, square, oval and rectangular holes from $1/16"$ to $2"$.

Rotating turrets provide rapid indexing for single or sequence punching. Precision hole location quickly obtained with Micro-twin gauges. Punched sheet metals up to 16 gauge mild steel, fibre-



Dial a hole in a jiffy. Micro-meter front operated back and side gauges provide instant gauging.

board, asbestos, paper, cork, leather, rubber, plastic and other sheet materials.

Dies are mounted in turrets—always handy. Standard clearance between punch and die is $.002"$. Choice of 6 other clearances at no charge. The Di-Acro Turret Punch Press is safe, simple to operate—requires little maintenance.



Consult the yellow pages of your telephone directory under machinery, machine tools for the name of your Di-Acro distributor or write us for Quick Facts Folder describing this and other Di-Acro Machines.

DI-ACRO CORPORATION

formerly O'Neil-Irwin Mfg. Co.

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**BIG SAVINGS IN
LARGE CUTS**



CUT YOUR COSTS OVER 25% ON END MILLS 1½" DIAMETER AND LARGER WITH

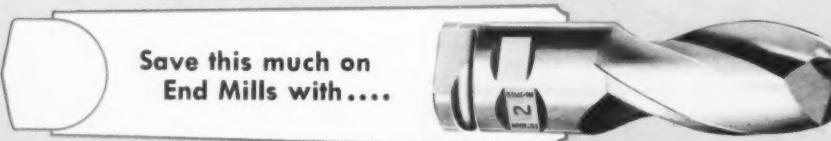
The Putnam Postiv-Lok design for large end mills eliminates the need for and expense of long tapered shanks. Instead, the Postiv-Lok concept of end mill tooling puts the heavy shank on a holder that quickly pays for itself through savings realized in the purchase of Postiv-Lok end mills.

Also, the use of Postiv-Lok end mills and holders eliminates the costly breakage that is possible with welded shank end mills. Postiv-Lok end mills are milled from solid steel—there are no welds that might break and separate the shank from the fluted portion.

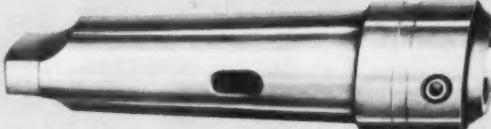
Thus, Postiv-Lok eliminates a cause of costly shut-downs and replacements.

Another cost saving is realized with Postiv-Lok during tooling change-over. Being much lighter, Postiv-Lok end mills are easier to handle than large tapered shank end mills—easier to insert and remove. And, when the next operation requires a different style or size of end mill, or even drilling and reaming, Postiv-Lok adapters permit quick change-over from one tool to another without changing the holder in the spindle.

Save this much on
End Mills with....



PUTNAM
POSTIV-LOK HOLDER



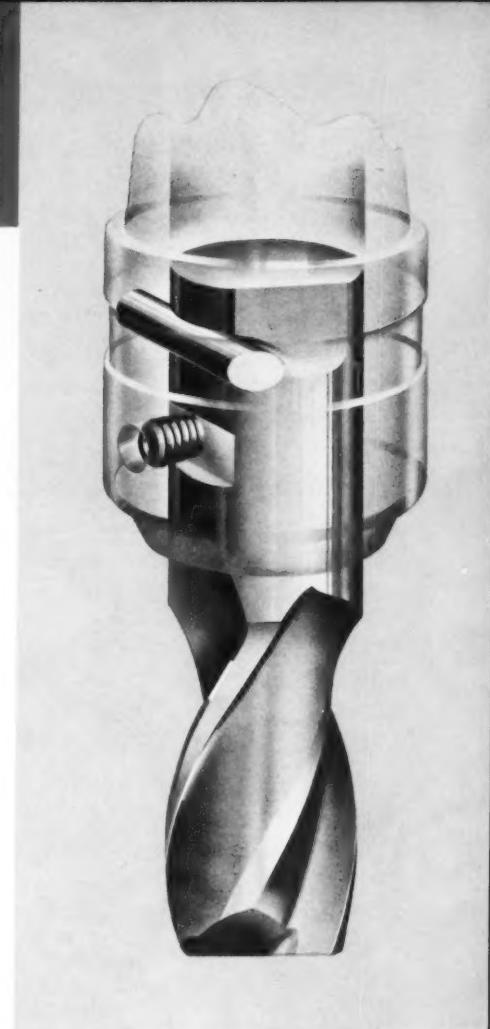
PUTNAM PRECISION TOOLS



Postiv-Lok is a proven locking mechanism for large end mills. It has saved time and costs for countless users throughout the country. Try it on your most rugged milling application. Postiv-Lok is available from stock on end mills ranging from $1\frac{1}{2}$ " to 3" in diameter. Also, it can be furnished in special sizes and designs to your specifications.

Here is how Postiv-Lok assures positive locking of end mills in the holder (see phantom drawing for lock construction). Simply insert the end mill in the holder so the top flat is positioned to pass the locking pin; give the end mill a quarter turn to the right and it is securely locked in the holder. Tightening of holder set screw prevents end mill backlash. The end mill cannot vibrate loose or pull out of the holder. In fact, the locking action is aided by the torque of the end mill in operation.

When put to work on big jobs, the fast, free-cutting action of Postiv-Lok



end mills really save time and costs. Also, their exceptional durability assures long life even when operated at high speeds and heavy feeds. Try them on your toughest jobs—they will get them done faster and at lower cost.

CUT FASTER - LAST LONGER



Over 1800 Standard Types & Sizes of Putnam End Mills

Now you can order standard end mills ranging in diameter from 1/32" to 6" and get off-the-shelf delivery. In the Putnam line of over 1800 standard types and sizes, are many end mills that are considered as "specials" by other manufacturers.

Regardless of your requirements, there probably is a Putnam standard end mill that will exactly meet your needs. Thus, you can obtain quicker



delivery, plus all the superior Putnam cutting qualities, and at lower costs than "specials".

You will save time, money and space by using the services of your local Putnam Distributor

- He has large stocks that are immediately available.
- He is dependable and handles quality products.
- A source for new techniques and new products.
- Being one source for many products,

he simplifies your purchasing.

- He affords personalized attention to your needs.
- Using his services assures savings in your stockroom space requirements.
- His stocking of products means you have less money tied up in inventory.

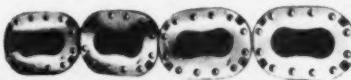


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ABRASIVE MACHINING

eliminates hidden costs



IMPROVES ACCURACY and FINISH

COST-PER-PIECE



REDUCED *9.83

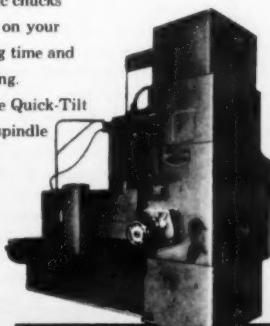


these jobs were switched from milling to
(high-powered) **SURFACE GRINDING**

* * * * *

Abrasive machining of flat pieceparts simplifies the total job — setup, loading, and tooling. Improvements in grinding wheels and high-powered surface grinders change the basic *economics* of flat machining. It is now economical to *remove stock* on a Mattison grinder because of the high average running time and efficient stock removal inherent in today's process. With self-sharpening wheels, the only noncutting machine time is for loading and unloading the work. Simplicity of magnetic chucks minimizes workhandling and holding problems. You get a high net return on your capital investment — and, as hundreds of jobs prove, your actual machining time and wheel cost per piece can be less than their equivalents in big-chip machining.

Extent of new developments in machine capability can be illustrated by the Quick-Tilt vertical rotary (shown). This grinder has selector-switch actuated, power spindle *tilting*. Parts can be roughed with a tilted wheel and finished with a flat wheel in *one* operation. You save horsepower, machining time (50% or more), and grinding wheels. Wheel specifications are less critical, too, extending their usable range. Mattison is putting up to 200 hp on surface grinders — taking $\frac{1}{4}$ " stock off large surfaces in $2\frac{1}{2}$ minutes. With proper application of horsepower and rigid machines, you get *economical wheel life*, plus all the advantages of a "throwaway" cutting tool. Investigate *abrasive machining* for low-cost stock removal and fine finishing of large and small pieceparts. We'll be happy to demonstrate, on your work, in the Mattison Methods Lab.



MATTISON MACHINE WORKS

Rockford, Illinois

Phone WO 2-5521

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August, 1961

MODERN MACHINE SHOP 49

Bridgeport

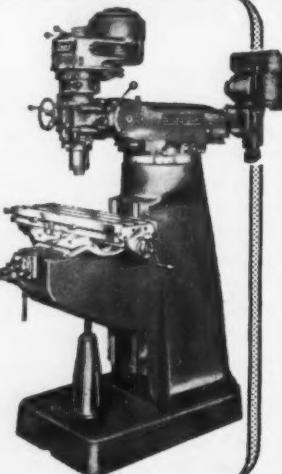
PROFITABLE PRODUCTION

"The Most for the Least"

Experience in countless shops, large and small, points to the fact that jobs are handled profitably at low cost with maintained precision on versatile BRIDGEPORT TURRET MILLING MACHINES. Adaptability of "Bridgeports" to tool room or production line accounts for their universal acceptance.

Recently, Bridgeport told the story of a plant where a Bridgeport Miller prototyped an important piece of military equipment. This machine proved the "nest egg" for a successful and profitable business. Starting with a single machine, this plant's requirements have grown to where a battery of sixteen "Bridgeports" is now in daily operation on a wide range of work.

Thus we find "Bridgeports" handling milling, drilling, boring, right angle milling, slotting, cherrying, fly cutting, profiling and hydraulic duplicating. Constant development of attachments has contributed to versatility. Precision not only assures profitable production but also means a high return on a most moderate investment.



For further details consult your nearest dealer or us direct.

Bridgeport® MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

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"SUB-ZEROING"

IMPROVES GEAR & PINION

Performance

Ruggedly constructed for heavy production schedules, this unit will chill tons of steel in one hour from ambient to - 125° F.

Model illustrated 3SR-120-75. Seventy-five cu. ft. chamber.

**Processing of steel
at sub zero temperatures
greatly increases wear life.**

The successful manufacture of pinions that will take considerable punishment has been a major problem in the gearing industry. Through years of research, The Tool Steel Gear and Pinion Company of Cincinnati, Ohio has developed special

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choose
**CINCINNATI
SUB-ZERO
CHAMBERS**



gear manufacturing techniques that in application after application have proved extremely successful in providing extra hard gear teeth while still preserving the strong ductile supporting core necessary to withstand severe service conditions.

Write for a no-obligation proposal on the equipment best suited to your application through CUSTOM ENGINEERED DESIGN.



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Ever see anything so versatile as **LAMINUM®**?

Generally, laminated shims of LAMINUM are custom stamped to blueprint specifications. Because the laminations are so easily p-e-e-l-e-d to bring the shims down to desired thickness, LAMINUM shims are used universally on assembly lines where they save time and cut costs.

But occasionally you run into a special situation—the need for a shim of *varying* thickness, for example. LAMINUM solves that problem with cost cutting ease. As illustrated, the shim is scored into quarters. Then layers are p-e-e-l-e-d from the

quarters so as to come up with varying thicknesses to correspond with variations in the job at hand.

That's LAMINUM! It's fast. Practical. Precise. No need for stand-by equipment. No machining. No grinding. No counting. No stacking. No milking. And no grit between layers—ever.

For quick estimates and service, send your prints to the Laminated Shim Company, Inc., West Coast Sales and Service 600 Sixteenth St., Oakland 12, Calif. • Home Office and Plant 3308 Union St., Glenbrook, Conn.



LAMINUM is the registered trade name for Laminated Shims with layers completely surface bonded to look and act like solid metal. Send for Design Folder No. 4.

IN BRASS • MILD STEEL • STAINLESS • ALUMINUM... WITH LAMINATIONS .002" OR .003"
NOW ALSO IN TITANIUM WITH LAMINATIONS .003"

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Precision Ground **ATRAX** **SOLID CARBIDE
TOOLS AND BURS**

Job Applications

**ATRAX LEADS IN
ELECTRONICS & SPACE AGE
SOLID CARBIDE TOOLING**

NEW BROCHURE SHOWS

Small, Very small and Miniature

**TOOLS FOR ELECTRONICS CIRCUIT BOARD
AND INSTRUMENTATION APPLICATIONS**

**ATRAX
MICRO-DRILLS**

Wire Sizes #40 through #80.

**ATRAX
DRILL BLANKS**

Wire Sizes #40 through #80.

**ATRAX
MINIATURE END MILLS**

From 1/32" to 1/8" diameter in 2 flute and 4 flute series.

**ATRAX MINIATURE
STUB ROUTERS**

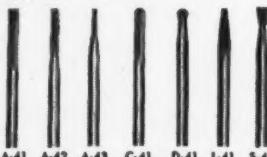
Recommended for routing glass epoxy materials, Fiberglas, phenolics, bakelite, fiber and other synthetic materials.

This brochure is available free. It's a guide for selecting and ordering carbide tools for practically any operation on conventional materials as well as abrasive plastics, fibers, synthetics, laminates and exotic materials and alloys.

**ATRAX
MINIATURE HOLE
GRINDING BURS**

Hole finishes of 2 micro-inches or better can be expected using these burs.

ATRAX MIDGET BURS
All burs with 3/32" shanks, 1 1/4" overall.



**ATRAX MINIATURE
MICRO-REAMERS**

In Fractional and Decimal Sizes. Recommended for all materials up to Rockwell C-56.

**SEND FOR THIS NEW
BROCHURE NOW!**

It will help you to longer tool life, improved tolerances and greater production on hard-to-cut materials.



THE ATRAX COMPANY
240 DAY STREET
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NOW ALSO IN TITANIUM WITH LAMINATIONS .003"

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HARDINGE
ELMIRA, N.Y.

**HIGH SPEED
SUPER-PRECISION
SECOND OPERATION MACHINE**



The Outstanding Machine for High Speed Production
It Is FAST-ACCURATE-DEPENDABLE

Write HARDINGE for Bulletin DSM 59

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

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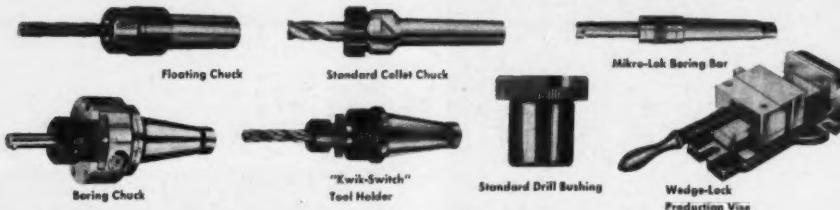
UNIVERSAL JIG AND FIXTURE COMPONENTS AND CLAMP ASSEMBLIES

Shown here are a few of more than a thousand different items in regular steel and stainless steel—the largest and most complete selection in the United States—now available from Universal Engineering Co. Write today for your copy of the complete, new catalog.



213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS



UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 9, MICHIGAN

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August, 1961

MODERN MACHINE SHOP 55



WALKER-TURNER 17" DRILL PRESSES

EVERYTHING NEW *but the price!*

Because the entire line of W-T "Light-Heavyweight" 17" Drill Presses has been completely redesigned, it now gives you new flexibility, new accuracy and new convenience. You'll like the increased operating economy you get, but even more, you'll like the price tag. All 44 hand feed models of the "New 17" are being introduced at no increase in cost! And for semi or fully automated drilling jobs, you can add new Rockwell Power Feed. This low cost accessory is available on every model.

Only you can rate the value to your job of pace-setting features such as New Concept Depth Stop, New "Swing Away" Guard and New "Pivoting" Motor Mount. To see this machine in action visit your Walker-Turner Distributor (listed under "TOOLS" or "MACHINE TOOLS" in the Yellow Pages). Learn for yourself why more people in metalworking call Walker-Turner the *value* line.



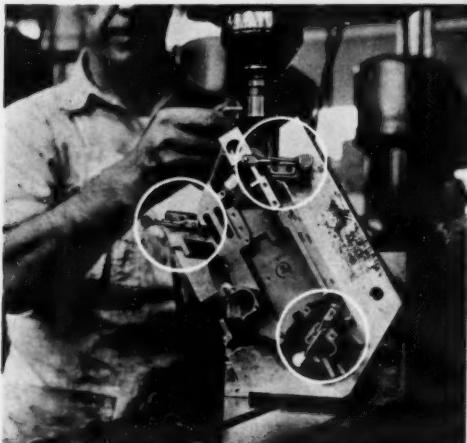
FREE BROCHURE pictures and describes the complete line of W-T 17" Drill Presses. Write: Rockwell Manufacturing Company, Walker-Turner Division, Dept. WH22, 400 N. Lexington Ave., Pittsburgh 8, Pa.

WALKER-TURNER
LIGHT-HEAVYWEIGHT MACHINE TOOLS
another fine product by
ROCKWELL

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Look what clamps are doing!

*Practical uses of Wespo Toggle Clamps
and Pliers that may suggest ways you can save*

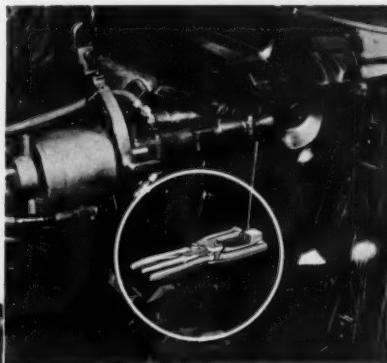


Miniature Toggle Clamps, only 2½" overall!—These small, light weight Wespo Series 50 Clamps can do a hundred different jobs on small fixtures such as the one shown above. Their compact design and smooth operation also make them useful in the assembly of small parts, in electronic wiring and soldering operations, on fixtures where space is limited... anywhere a small, rugged clamp is needed. Maximum holding pressure is 35 lbs. Available with a horizontal or vertical mounting base; adjustable spindle.

NEW 16-PAGE WESPO CLAMP CATALOG!

More than 80 different models and sizes of clamps are described to help you quickly select the proper clamp for every clamping job.

Ask your Wespo Distributor for a free copy today.



Low Cost Wespo Toggle Pliers have a myriad of uses in assembling operations—as portable clamps, clamping where space is limited, or overhead clamping. Their usefulness as portable clamps is demonstrated in this auto body welding operation. The plier shown has the Wespo "Quick-Trigger" release which permits one hand operation. All Wespo toggle pliers are engineered for fast, positive locking with a minimum amount of hand pressure. They are available in numerous styles and jaw sizes.

This Wespo Push-Pull Clamp serves as a simple fixture to hold a knurled ring securely during the drilling operation. The adjustable spindle is fitted with a large pad which mates with the inside diameter of the ring, holding it securely. Wespo makes a variety of push-pull clamps for use where smooth, horizontal clamping action is required. All models feature the "better 3-ways" Wespo design and are ruggedly built to stand hard use. Some models have locking action in both the "push" and "pull" positions.



WESPO

DIVISION OF VLIER ENGINEERING CORPORATION
A SUBSIDIARY OF BARRY WRIGHT CORPORATION
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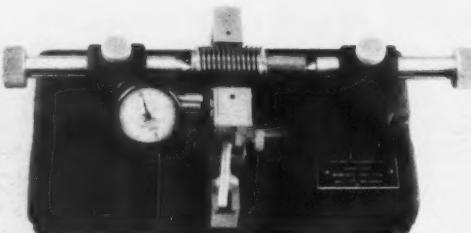
**GAGES GET A
FAST TRIAL
AND FAIR
SENTENCE...**

**with Pipe Machinery's
Drunken Thread Checker**

Easy to set up, easy to operate, Pipe Machinery's amazing new Drunken Thread Checker tries gages for helix deviation, or drunken thread, and passes sentence all in a matter of seconds! The finding it makes — a direct reading of the degree the helix deviates from normal — is final and incontestable.

A diameter over wire check of gages provides insufficient evidence to enable you to render an "acceptable" verdict. In order to be a fair judge in your gage inspection, a check for drunken thread, in addition to a careful examination of, among other things, lead, angles and pitch diameter is always required.

The instrument shown is easily adapted to product inspection with male or female centers.



For more complete information write us on your company letterhead today.



THE PIPE MACHINERY COMPANY

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NOW...

CONTINUOUSLY VARIABLE RANGE OF SPINDLE SPEEDS

WITH CONSTANT HORSEPOWER THROUGHOUT

Now, by simply pressing a button until the desired speed is indicated on the direct-reading tachometer, you can select any spindle speed from 43 to 3500 RPM.

The new Micro-Turn features exclusive Nebel coaxial headstock spindle design plus mechanical beltless type variator drive unit (5 HP), which delivers constant horsepower throughout the entire range and maintains drive output speed within two-tenths of one percent. This assures maximum torque at low speeds for heavy cutting and ultra fine finish at highest speeds, with supreme balance and minimum vibration. Built-in positive torque responsive mechanism prevents slippage under starting or shock loads.

Other features include:

- exclusive feed converter unit, located in apron, providing simple conversion from standard to optional feed ranges without affecting standard thread ranges;
- double-wall, one-piece totally enclosed apron;
- fail-safe pressure lubrication to headstock, gear box and end gearing;
- pressure lubrication to carriage and cross slide ways provided by pump located in apron; one-shot plunger to lubricate cross slide ways when carriage is stationary;
- choice of manual or automatic coolant operation.

For the complete, illustrated story on the revolutionary MICRO-TURN, write today for your copy of Bulletin No. 222. Nebel Machine Tool Corporation, Lathe Division, 3409 Central Parkway, Cincinnati 25, Ohio.

Nebel
MICRO-TURN
HIGH SPEED PRECISION LATHE

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Do you know what metallizing can do for you today?

With today's improved metallizing materials and methods:

PLANT EXECUTIVES find new ways to slash maintenance costs, reduce downtime, cut machine parts inventory...

JOB SHOP OPERATORS find new ways to build highly profitable business doing parts-salvage and maintenance work for plants in their area.

JOB SHOPS

make good money with metallizing because they save good money for local firms.

METCO has prepared a special bulletin detailing actual operations and costs of typical flame spraying work on shafts, templates, bearings, many other surfaces. Use coupon to get your free copy.

NEW! Business-building kit for job shops, to help METCO equipment owners build new business, pay off investment in minimum time, and use flame spraying to increase other machining and welding business. Contains samples of direct mail letters, post cards, envelope stuffers, photos, advertising mats. These promotion materials are available in lots of 100 at our cost, well below what you'd have to pay to print your own. One copy of kit available free—send for it today. (See coupon.)

These real-life examples show how plants save money, job shops make money with metallizing

Necks of winding rolls in a textile mill were formerly repaired by a slow machining method, requiring highly skilled labor. Now the worn necks are built up with flame sprayed metal, quickly machined to size. Savings run \$20,000 a year.

A job shop in California specializes in flame spraying oil well pump plungers, gets all the business it can handle in spite of the fact that the plungers it hard-faces last eight times as long as new ones. The largest ones cost only \$45.00 to rebuild, against \$110 to replace. Volume on just this one profitable metallizing service: \$35,000 a year.

Valve plugs and seats, working in sand, oil and salt water, lasted only a few hours in service. Hard-faced by welding, a set cost \$155, lasted from 3 to 8 hours. When flame sprayed with tungsten carbide powder, service life was increased to a minimum of 2 weeks, 4100% longer! Cost of metallized set, \$73. But reduced downtime far outweighs the dollar savings.

A Connecticut job shop makes a very good profit when it flame sprays small



Any good mechanic can quickly master the three basic steps of metallizing: 1. prepare the surface; 2. flame spray; 3. finish.

shafts for \$27.50. The customer is happy, too—he formerly had to pay over \$50 to have shafts built up with welding.

The same job shop salvaged a big degreasing tank, value \$2,850, by flame spraying with zinc for \$683. The shop made money, the customer saved money.

A shipbuilding company installed metallizing equipment to repair such parts as pump rods, pistons, crank shafts for diesel engines, stern bushings, valve stems. A badly worn tugboat shaft, replacement cost \$3,000, was repaired and made better than new for \$400. That job alone more than paid for the METCO equipment.

From these cases you can see how modern metallizing pays, whether in plant maintenance departments or in job shops serving the many companies that

don't need their own installation. Whenever there's wear, in rotary or sliding action, there's an opportunity to save money and make money.

New and improved materials

Among these new materials are a number of nickel, chrome, boron hard facing powders. Sprayed tungsten carbides are also widely used. Many others are available to give new values to the basic benefits of metallizing, which may be summarized as: less downtime; far less machining or grinding time, reduced parts inventory; and "better than new" performance of the metallized parts.

With savings like these there is plenty of leeway for good job shop profits and big savings for manufacturing plants. To learn more about these opportunities, check the coupon and send it off today.



METCO INC.
FORMERLY METALLIZING ENGINEERING CO., INC.
Flame Spray Equipment and Supplies

1177 Prospect Avenue, Westbury, L. I.
New York Telephone: Edgewood 4-1300
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JOB SHOPS ONLY

How
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make money
with
Metallizing

- Send Bulletin 14, "How Job Shops Make Money With Metallizing"
- Send Business-Building Kit
- Have Field Engineer Call

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PLANT MANAGEMENT

How to
SAVE MONEY
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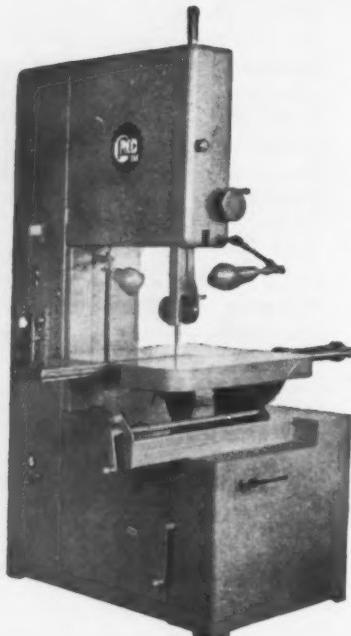
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"How to Save Money and Cut
Downtime with Metallizing"
- Have Field Engineer Call

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The new GROB 24" universal band saw
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- Speeds infinite from 35-12000 FPM covers both cold and hot sawing

- Variable drive 3-speed transmission with precision rolled gears and splines transmits 15 HP

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FILING MACHINES
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GRAFTON, WISCONSIN

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The Payoff is Performance



G-E Man-Made diamond bats 1.000 against high costs

Do you want to do something about high costs . . . boost your grinding efficiency . . . step up output per wheel?

Grinding wheels with G-E Man-Made diamond are making important contributions to the metalworking industry. An on-the-job test would show you that the crystal characteristics of controlled shape and friability that are built into G-E Man-Made diamond result in consistently superior grinding performance—bat 1.000 every time!

Do this. Call your grinding wheel supplier and order a wheel containing G-E Man-Made diamond. Test it in actual production in your own shop. You'll see what we mean.



A carbide cutting tool manufacturer—grinding single-point carbide tools—compared 6" x $\frac{3}{4}$ " x $1\frac{1}{4}$ " plain cup wheels, vitrified bond, 120 grit, 100 concentration—dry grinding. In this actual case history the natural diamond wheel removed 37.1 cubic inches of carbide, whereas the wheel containing G-E Man-Made diamond removed 53.4 cubic inches. Superiority of G-E Man-Made over natural? 44 per cent!

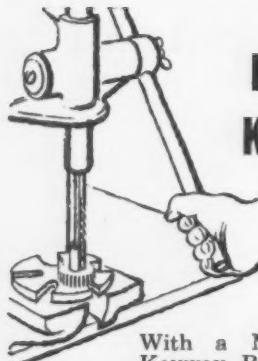
METALLURGICAL PRODUCTS DEPARTMENT

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INSTANT KEYWAYS



With a Minute Man® Keyway Broach you can cut a keyway, by hand, in an arbor press in one minute for as little as one cent. Available individually or in kits complete with broaches, bushings, shims and key stock. For keyways from $\frac{1}{16}$ " to 1" in any bore $\frac{1}{4}$ " to 3".

Minute Man®

(A) SQUARE BROACHES
For finishing $\frac{1}{4}$ " to 1" square holes in one pass in cast or drilled bore. (32nd sizes, too)

(B) HEXAGON BROACHES
For finishing $\frac{1}{4}$ " to $\frac{3}{4}$ " hexagon holes in one pass in cast or drilled bore.

(C) ROUND BROACHES
For finishing $\frac{1}{4}$ " to 1" round holes in one pass in drilled bore.



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MAIL FREE BROACH CATALOG AND PRICE LIST \$ describing Square, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

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Meetings

Important Meeting Dates



AUGUST 28-SEPTEMBER 1 • The American Society of Mechanical Engineers, International Heat Transfer Conference, University of Colorado, Boulder, Colo. Society headquarters: 29 W. 39th St., New York 18, New York.

SEPTEMBER 11-15 • Instrument Society of America, Fall Instrument-Automation Conference and Exhibit and Annual Meeting, Memorial Sports Arena and Biltmore Hotel, Los Angeles. Society headquarters: 313 Sixth Ave., Pittsburgh 22, Pennsylvania.

SEPTEMBER 14-15 • American Society of Mechanical Engineers, Engineering Management Conference (ASME-AIEE), Hotel Roosevelt, New York. Society headquarters: 29 W. 39th St., New York 18, New York.

SEPTEMBER 17-21 • Nonferrous Founders' Society, Annual Meeting, Shawnee Inn, Shawnee-on-Delaware Pa. Society headquarters: 1604 Chicago Ave., Evanston, Illinois.

SEPTEMBER 24-28 • Pressed Metal Institute, Annual Meeting, Grand Hotel, Point Clear, Ala. Institute headquarters: 3673 Lee Rd., Cleveland, Ohio.

SEPTEMBER 25-26 • Steel Founders' Society of America, Fall Meeting, The Homestead, Hot Springs, Va. Society headquarters: 606 Terminal Tower, Cleveland 13, Ohio.

SEPTEMBER 25-28 • Association of Steel and Iron Engineers, Annual Convention, Penn-Sheraton Hotel, Pittsburgh. Association headquarters: 1010 Empire Bldg., Pittsburgh 22, Pennsylvania.

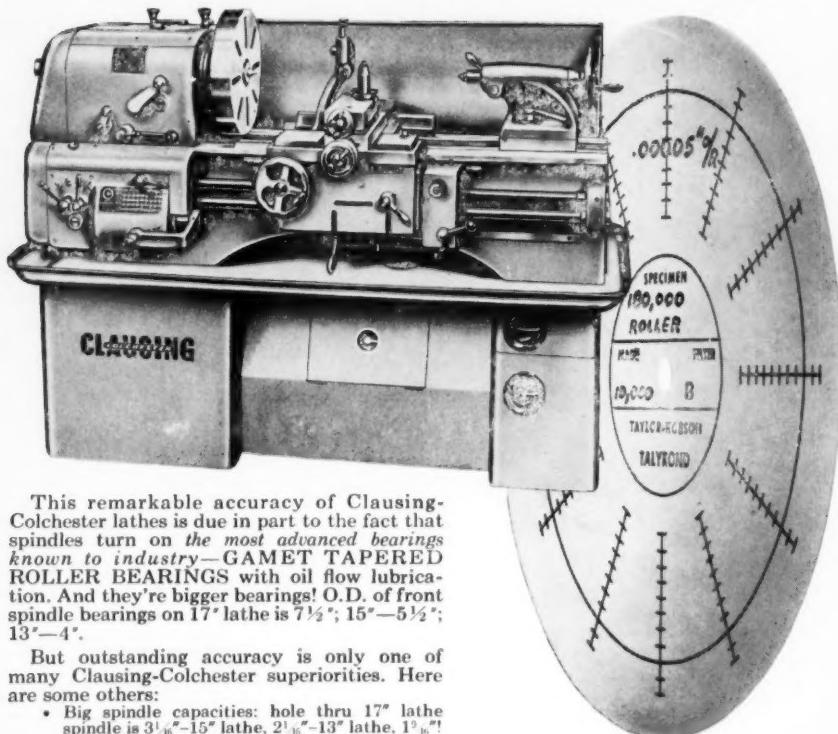
SEPTEMBER 27-28 • American Die Casting Institute Inc., Annual Meeting, Edgewater Beach Hotel, Chicago. Institute headquarters: 366 Madison Ave., New York 17, New York.

CLAUSING

COLCHESTER

GEARED-HEAD LATHES

turn ROUND within .0001"



This remarkable accuracy of Clausing-Colchester lathes is due in part to the fact that spindles turn on the most advanced bearings known to industry—GAMET TAPERED ROLLER BEARINGS with oil flow lubrication. And they're bigger bearings! O.D. of front spindle bearings on 17" lathe is 7½"; 15"—5½"; 13"—4".

But outstanding accuracy is only one of many Clausing-Colchester superiorities. Here are some others:

- Big spindle capacities: hole thru 17" lathe spindle is 3 $\frac{1}{8}$ "-15" lathe, 2 $\frac{1}{8}$ "-13" lathe, 1 $\frac{1}{8}$ "!
- Induction-hardened bed ways.
- All-gearied headstock.
- Oil bath lubricated headstock and quick-change gear box.
- Separate feed rod for power feeds.

Best of all, Clausing-Colchesters are the greatest lathe values you'll find anywhere. Prices for the 13" straight bed model start at \$2440; 15"—\$3415; 17"—\$5100. Prices include motor and magnetic controls. Gap bed and profiling lathes available in all three sizes.

Get ALL the facts. Write for descriptive literature on the "Greatest Buys in Lathe History!"

POSITIVE PROOF!

Every Clausing-Colchester must turn round within .0001". Accuracy is checked by inspecting a turned work piece on a Talyrond which measures and records in millionths on a graph like the above. Work piece and graph are supplied with each lathe as proof of its superior accuracy.

CLAUSING
DIVISION OF
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OUTSTANDING VALUES IN PRECISION MACHINES



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356





Watching the "Touch of Gold" come to the surface

Operating a surface grinder equipped with segments of Norton 23 ALUNDUM* abrasive, this man sees production benefits taking actual form. High product quality is just one. Even more important is the free, fast cutting action that steps up both production rate and production economy. This is how Norton grinding wheels

bring the product-improving, cost-cutting "Touch of Gold" right to the surface of every grinding job — so every user can clearly see the advantages he's getting.

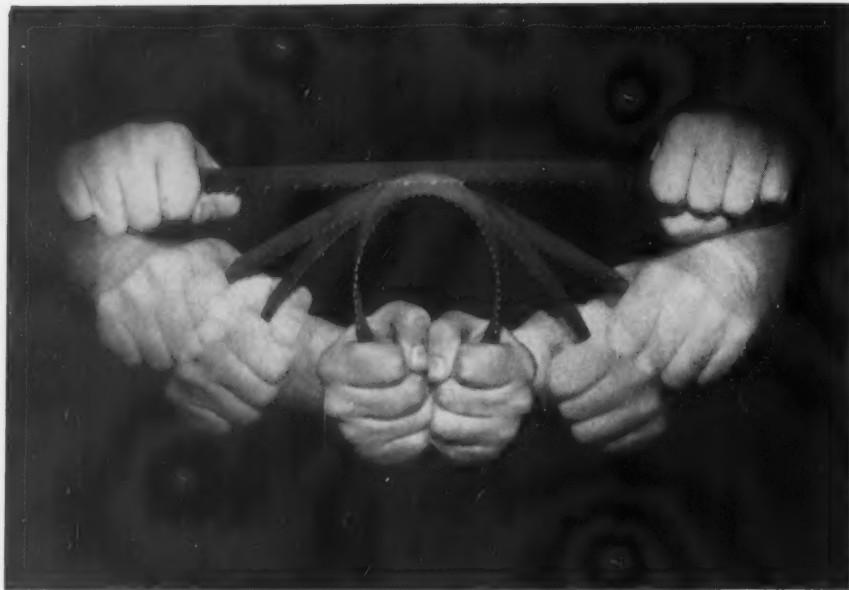
Watch "Touch of Gold" benefits taking place in your own plant. Your Norton Man, a trained abrasive specialist, or your Norton Distributor

will gladly help you get proof.
NORTON COMPANY, General Offices,
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*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries



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So it doesn't break---So what??

So we can bend a MARVEL High-Speed-Edge Hack Saw Blade double, and it won't break. Does this prove anything?

Let's see if it does. When you buy a box of hack saw blades, you expect each blade to have a reasonable cutting life. For example, take an ordinary blade that costs \$4.00, and you expect it to produce 2000 sq. inches of accurate cutting-off before it is discarded. Would you be willing to pay \$8.00 for that same blade? *You will, if it breaks halfway through its expected life.*

Bending a MARVEL High-Speed-Edge Hack Saw Blade to demonstrate that it is truly unbreakable proves the point that you get every

square inch of blade life you pay for when you buy MARVEL Blades.

Safety to both operator and machine, plus maximum blade life, seem like value enough from this remarkable blade. However, these MARVEL Blades give you even more, for they will cut faster, with greater accuracy because they can be safely tensioned more taut in your machine than ordinary "breakable" blades and are therefore more rigid to resist deflection.

Cost? Unbreakable MARVEL High-Speed-Edge Hack Saw Blades are priced competitively. Use MARVEL Blades consistently with complete confidence because they have no equal for value. Leading Industrial Distributors stock and sell MARVEL. Ask yours today.

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NEW FOR 1961

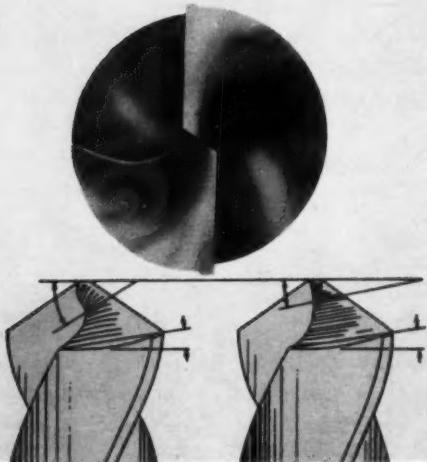
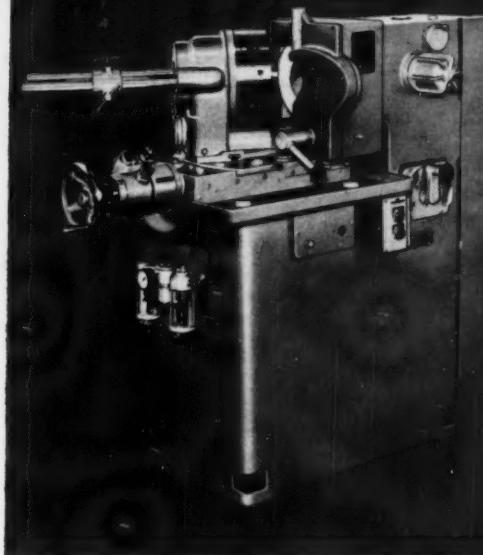
OLIVER OF ADRIAN

MODEL 600

DRILL POINTER

For 40 years, the theoretically perfect *Oliver Drill Point* has been an industry favorite. Oliver's new drill pointer has been completely redesigned—offers more advantages than ever before! Retaining the thoroughly proven point, the machine has the ability to stand up even longer under rigorous day-after-day service.

The three versions of the "600" have a capacity of $\frac{1}{2}$ " to 3". One is for dry grinding, one for wet grinding, and one is a combination wet grinder with an "airdraulic" automatic infeed for larger drills. Wet grinders are particularly important for drills requiring extensive stock removal. The airdraulic infeed makes the machine 100% automatic after set up (can be operated manually if desired).



Easier Penetration

The proven *Oliver Drill Point* is known for providing more holes per grind. Less torque—less thrust is needed for penetration. Lower feeding pressure saves on drilling machine repairs, power costs and drills. The *Oliver Drill Point* is ground to increase clearance as the center of the drill is approached. Each lip does its equal share. The drawing at the right shows a conventional drill point with constant clearance. The one at the left is an exaggerated view of the *Oliver* point. You can see that the clearance angle increases rapidly as the drill web is approached.

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Machine Provides Complete Accuracy

New features of the Oliver Model 600 Drill Pointer are built around the demands for accuracy and trouble-free operation.

- A new scroll-type chuck is incorporated. Moving parts are sealed against foreign material and a recirculating lubrication system and anti-friction bearings assure long life. A dual support center rest assembly provides greater accuracy.
- Variable clearance—approximately six times greater than ever before—is supplied with a new hand wheel control.
- Direct drive to the chuck—no universal joint.
- Grinds two-, three- or four-flute drills.
- All components are larger and heavier. Controls are in front for simple operation.

Oliver also provides bench model machines for sizes $\frac{1}{2}$ " and smaller. A cam-controlled, heavy-duty model grinds the *Oliver Drill Point*. A standard machine is also available for the conventional point.

Yes, the Oliver of Adrian Drill Pointer is bigger and better than ever. Oliver will sharpen your drills on a "no charge" trial basis. Write for full information—satisfy yourself—then give us an opportunity to quote.

OLIVER of ADRIAN

1430 E. Maumee St. • Adrian, Michigan

DRILL GRINDERS AND THINNERS AUTOMATIC AND MANUAL
FACE MILL GRINDERS TOOL AND CUTTER GRINDERS TOOL
BIT GRINDERS CONTOUR SAWING AND FILEING MACHINES

OVER THE EDITOR'S DESK



FRED W. VOGEL

DOWN UNDER

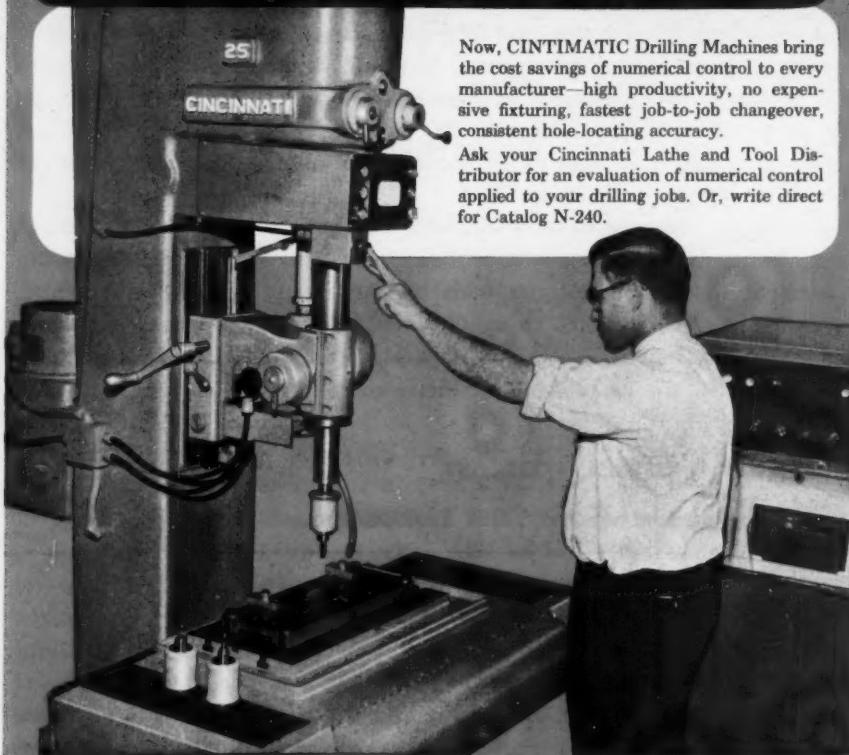
Numerous opportunities for sales, investment, and expansion of America's metalworking industry are available in Australia. This is the conclusion highlighting a 7-week survey and analysis of the field Down Under made by Philip R. Marsilius, executive vice president of The Product Machine Co., of Bridgeport, Conn., who served as adviser on the subject for the first U. S. Department of Commerce trade mission to the area.

According to Mr. Marsilius, Australian industrialists expressed a keen interest in the latest U. S. machinery and tools, either to import and sell to manufacturers, or for use in their own production. Anxious to avoid duplication, they wish "to take advantage of our progress and accomplishments in the technical, engineering, and scientific fields."

A review of imports of metal products indicated numerous gaps in Australian manufactures. These covered a wide range of categories and included such items as tool steel, specialty steels, special tools, screw machine products, metal stampings, metal cutting and forming machine tool accessories, lathes, millers, surface and cylindrical grinders, punch presses, industrial pumps and controls, commercial and domestic control heating and air conditioning equipment, agricultural machinery, ancillary equipment for mining, water farming, food processing, and electrical, communications, and material handling equipment.

Interest is high in obtaining agency representation, licensing and joint arrangements for these products, the report states. Many businessmen already distributing or manufacturing various related items under license, are anxious to form additional connections to further diversify their product lines. A guide for those contemplating trade and investment is provided by an analysis of the Australian metalworking scene. It is pointed out that

Cut Your Drilling Costs With
CINTIMATIC NUMERICAL CONTROL...
 only **\$13,155!***



Now, CINTIMATIC Drilling Machines bring the cost savings of numerical control to every manufacturer—high productivity, no expensive fixturing, fastest job-to-job changeover, consistent hole-locating accuracy.

Ask your Cincinnati Lathe and Tool Distributor for an evaluation of numerical control applied to your drilling jobs. Or, write direct for Catalog N-240.

* This low, complete price includes 25" numerically controlled drill with complete electric, power feed, back gear, and Infaspeed variable speed drive; 10" x 20" tape controlled, hydraulically operated positioning table; Cincinnati Acramatic control con-

sole with tape reader; complete installation and demonstration service.

This machine is readily adaptable for optional tape control of automatic feed cycle; depth selection from six pre-set stops; tool change indicator.

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HYDRAULIC Lathes / CINCINNATI Drilling Machines / SPROPOINT Drill Sharpeners

CINTIMATIC Numerically Controlled Lathes and Drills



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Over the Editor's Desk . . .

throughout the country's metalworking plants a wide range of imported machinery is in evidence. Due to the size of the market, Australian manufacturers deem it necessary to produce a variety of products, often cutting across several industrial lines.

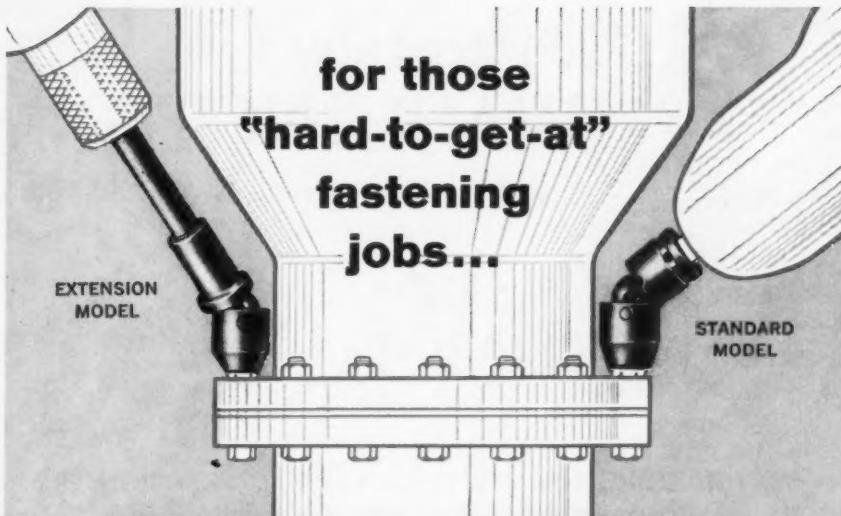
Prime importance is placed on the flexibility of machinery, equipment and personnel. Market size also causes Australian industry to gear itself to low volume or job lot production. Rarely is automatic equipment called for except in some automotive plants requiring machinery which might be better termed semi-automatic. In such cases, Detroit techniques are followed closely and applied or modified to suit the prevailing level of output or type of production.

During its visit, the mission met with nearly 5,000 government officials, civic leaders and businessmen who expressed an interest in expanding commerce and investment ties with the American industrial community. From these contacts more than 400 tangible business opportunities were developed, the emphasis being on licensing arrangements or joint ventures and, of course, the possibilities for increased exports to Australia.

NUMERICAL-CONTROL FORECAST

We are indebted to The Value Line Investment Survey for the recent report of its investigation of the application of Numerical Control to machine tools. Numerically-controlled machine tools, the investigation reveals are the one bright spot in the current limping advance of the industry's new orders. They make it possible for a shop to do small-lot work with the same precision and the same cost savings hitherto enjoyed only in mass production. Thus, commercial use is opening up, where formerly most use was for military or test applications. Sales of such equipment have doubled in each of the past 3 years. In 1961, however, for the first time, as the Value Line Survey notes, numerically-controlled machines will account for a significant portion of the tool industry's total volume—perhaps \$50 million out of an estimated \$500 million total for the industry.

By the mid-1960's, numerically-controlled machine tools are expected to represent 25-30 percent of industry shipments (about \$200 million out of a projected average of \$700 million a year in total machine tool sales).



for those
"hard-to-get-at"
fastening
jobs...

APEX UNIVERSAL WRENCHES and EXTENSION UNIVERSAL WRENCHES

An Apex universal wrench gives your power tool the flexibility needed to get right on fasteners located deep down where operating space is limited . . . even makes it possible to work around obstructions. Meets all safety requirements, will not bind or lock, even at maximum operating angle.

There are 1,268 types and sizes of Apex universal wrenches and extension universal wrenches among the more than 7,000 stock types and sizes of Apex fastening tools, each one developed to help reduce your fastening costs. In addition, we'll quote promptly on specials.

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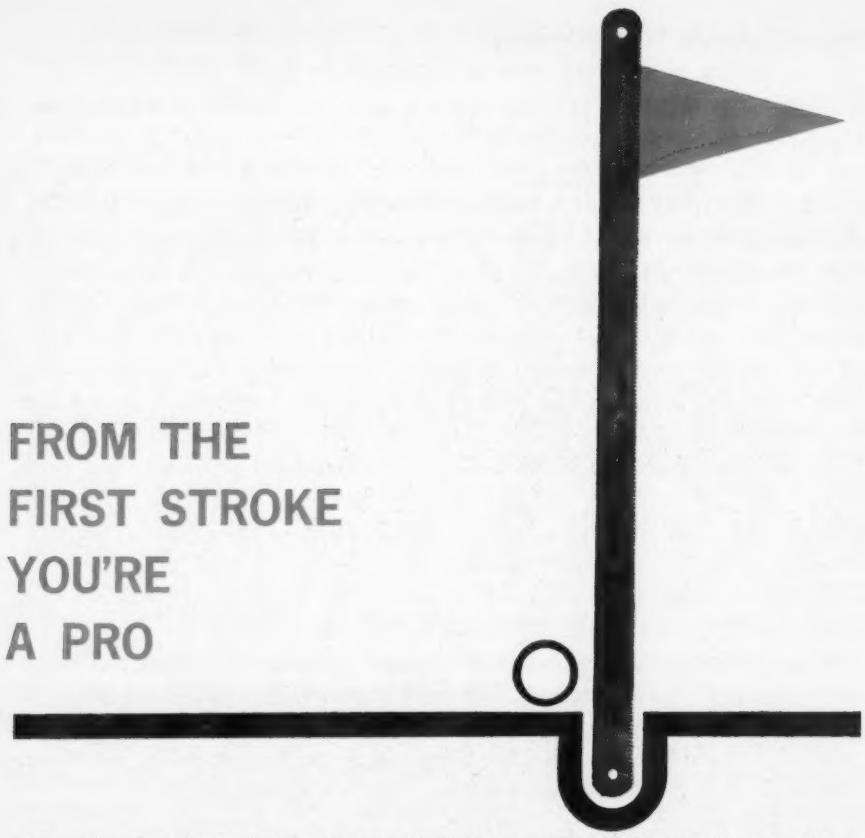
REPORT FROM WASHINGTON

on events which may affect you and your job.

- **WATCH THE CONSUMER FOR A CLUE TO THE RECOVERY'S SPEED**—whether the current business upturn will be mild or rapid. So far, the expansion has been much greater than generally expected. But the big test will come this Fall, when the first surge starts to slow. This is when higher spending by the consumer will be so crucial. Many analysts think he will come through. The recovery to date has come mainly from industry's recent shift in inventory policy—from heavy liquidation to modest rebuilding. This has spurred ordering, hiring, production—a 3% rise in economic activity. This Summer, U.S. outlay and business investment in new plant will manage to maintain some momentum. But it will take something extra to start a boom. That "extra" may well come from the consumer. Here's why: Personal income is up \$10 billion over 1960 . . . and will keep rising with additional jobs and longer hours. The record shows that folks tend to spend the bulk of any new income. Installment debt outstanding fell in the first part of the year—a trend usually reversed after a recovery has begun. So consumers are in good shape to borrow for wanted things. Some economists forecast a 5% jump in retail sales this Fall.

- **YOU'LL SEE A CHANGE IN BUSINESS PSYCHOLOGY** in the next month or so—a shift from the doubts about the scope of recovery that bothered businessmen during the late Spring. The recent letdown was par for the course—the kind of questioning that always occurs just after the first phase of a recovery. (These doubts showed up most clearly in the stock market's sinking spell.) Once consumers start making their buying felt,

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Report from Washington . . .

optimism will build up fast. As one forecaster puts it: "You will see the economy shooting into orbit."

• **FEARS OF RENEWED INFLATION ARE BEING EXAGGERATED** these days, in the view of many economists in government and industry. Even though the upturn proves to be vigorous, it is felt that men, money, and plant capacity are in very ample supply. The deficit building up for fiscal 1962 may be larger than the \$3.7 billion the Treasury is now predicting, but it won't generate a dangerous amount of new credit. The only real threat seen is from a cost-push spiral—excessive wage demands or hikes in administered prices. Negotiated wage increases are running a bit behind last year. Recent price stability has taken the wind out of union sails. And unions are concentrating on job security, insurance, etc. Wage hikes will average $8\frac{1}{4}$ cents an hour, as against 9 cents last year. Note the recent rash of price cuts in basic materials—paper, copper, glass, steel, etc. They're a result of competition, foreign and domestic. The stock market may not like them, but U.S. officials regard them as healthy. At long last, they believe, we may be in for good times without inflation. This doesn't mean that there won't be some price increases. Recovery is bound to catch some scattered commodities in short supply . . . at least temporarily. More importantly—but still months away—will be higher U.S. supported prices for Latin American items, to be negotiated starting this Summer.

• **GOVERNMENT PRESSURE WILL BE USED TO HEAD OFF PRICE HIKES** this year—still another factor that will tend to keep inflation in check. In the case of steel, for example, the President's Council of Economic Advisers has tried to project profit and productivity trends to show that a price rise isn't necessary. If the mills try hikes later this year, Kennedy will blast them.

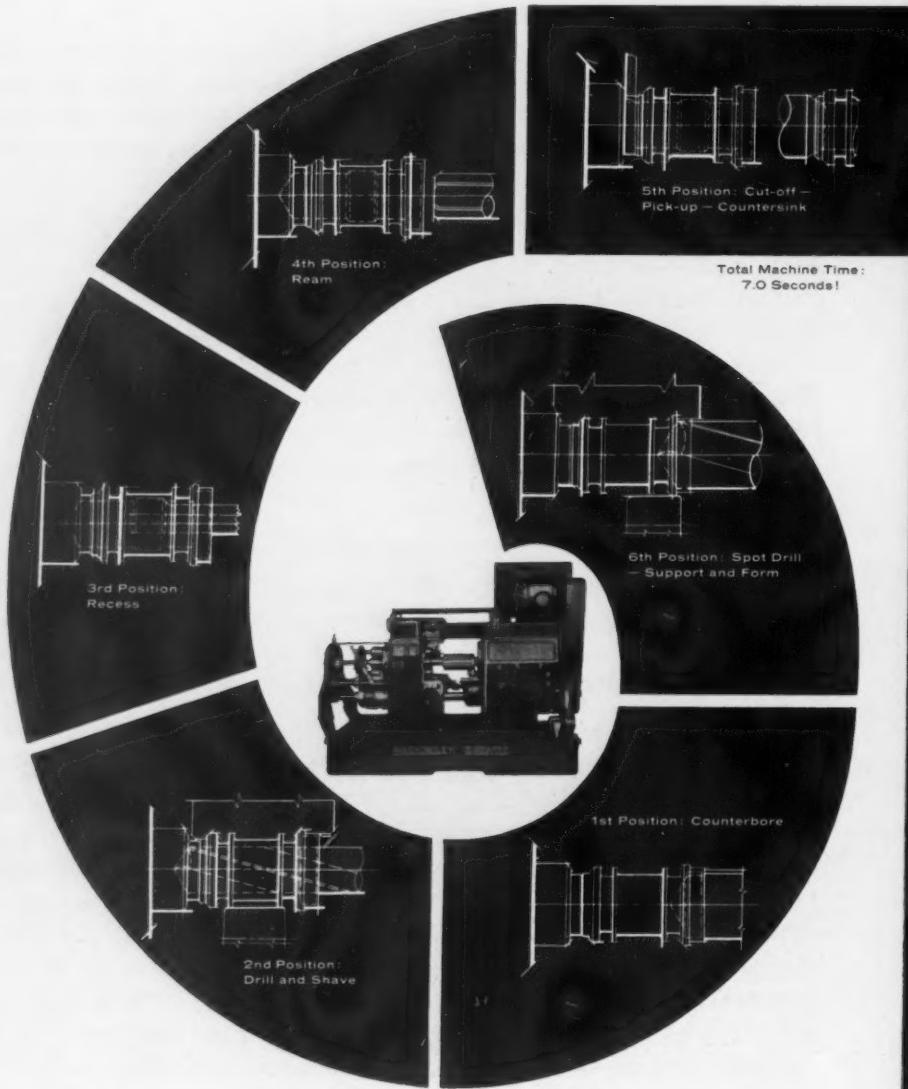
• **UNIONS SEEM LESS INCLINED TO GO OUT ON STRIKE,** according to labor experts. Rank-and-filers aren't very keen on walking out with unemployment so great and just when the work-week—and their paychecks—are stretching out. Besides, union leaders know that the U.S. will move in to end strikes that could interfere with recovery—thus casting labor in a poor light.

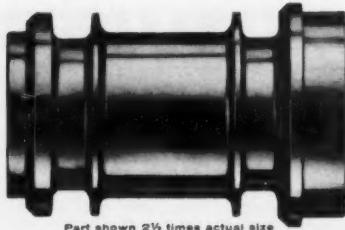
- A RAPID INCREASE IN CORPORATE PROFITS is being projected for 1962 on the basis of expected increases in business activity. There's growing acceptance of forecasts of a 3-4% pick-up in total output later this year and a whopping 8% next year. Price cuts may operate to squeeze net margins but the rising productivity that comes with recovery will more than offset. The slide in profits ended last Spring. The rise now under way will bring earnings before taxes for 1961 to about \$44 billion—same as last year. However, in 1962, the total will jump to well over \$50 billion—to a new record. The stock market is expected to reflect this improvement, starting in the Fall.

- YOU'RE GOING TO SEE MUCH FASTER ECONOMIC GROWTH in the next decade, according to a little-noticed study by the non-partisan National Planning Association. The forecasts project a rate of expansion of between 4½% and the 5% of the Democratic Platform. This will be well above the 2.3% of the second half of the Fifties, and will even top the more standard U.S. 3%. Three factors will be mainly responsible for this step-up: Increased productivity, up by 46% during the next 10 years. A larger labor force, reflecting increases in population. Increased plant capacity, plus vast outlays for research.

- BUSINESS IN CANADA IS BOUNCING BACK BRISKLY from a sharp recession. Main reasons are fast-rising exports—including foodstuffs to Red China—a relatively large government deficit, and improving business in the U.S. (Business activity in this country has an enormous impact on our neighbor. Economists feel that Canada's total output will be up about 4% this year.

- THE BILL TO LIMIT EXPENSE ACCOUNTS IS CURBING OUTLAYS already, even though Congress has yet to enact the Kennedy proposals—and probably won't pass them this year. Some companies are taking advantage of the pressure that's been generated to revamp their own policies. This way, they'll be ready if and when a bill passes . . . or if the Internal Revenue Service cracks down on present practices under authority that may already be on the books. What these companies are doing is telling their employees to curtail travel and entertainment expenses. As far as they can, these firms are trying to hold to the limits on hotels and meals embodied in the Administration's bill—\$30 a day. The hold-downs are being extended to lavish entertainment of customers . . . and many restaurants are complaining.





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AS I SEE YOUR SUPERVISORY PROBLEMS



For answers to your perplexing managerial problems address your letters to Mr. Alfred M. Cooper, MODERN MACHINE SHOP, 431 Main St., Cincinnati 2, Ohio.

By ALFRED M. COOPER

Consulting Editor, Modern Machine Shop and author of "How to Supervise People."

One of the most important functions within any industrial organization is the selection and training of employees to become the supervisors and executives who will direct the activities of the work force. In earlier issues of *Modern Machine Shop*, and in a number of books, I have given considerable attention to this procedure. Recently I have discussed the fact that too many skilled mechanics hesitate to seize opportunities offered them to accept promotion to supervisory rank and thereafter to executive rank. In the May issue of this magazine there appeared an excellent article on accident prevention in power press departments. The article was well done, but to me the most interesting section of it was the photograph and box outlining the career of its author. Every word of that brief autobiographical sketch should be carefully studied.

Thus, Mr. Greenough, the author, began his industrial experience as diemaker in the Chevrolet-Flint plant and shortly was made supervisor. From foreman he moved to superintendent of the die room. Thereafter he was promoted to production superintendent, to general superintendent and master mechanic of the Motor Plant, Chevrolet Aviation Engine Plant, at Buffalo, then came back to Flint as master mechanic of the V-8 Engine Plant. From this position he was appointed Plant Manager of the Chevrolet-Indianapolis Division in 1956.

Even should Mr. Greenough retire before receiving further promotion, it is evident that he has made a splendid record for himself with General Motors. And this record is in accord with the finest traditions of equality of opportunity in this country. It is based on his willingness to accept supervisory responsibility when offered to him at the time he was a diemaker.

The selection of minor supervisors is a two-phase proposition. That is, the employee's immediate superiors, management, and all of his co-workers have a stake in this matter. The superiors naturally want a man who is well-liked and also respected by everybody he contacts. He must be a man with potential ability to get out adequate production while yet retaining the good will of his subordinates.

But this key man, who is being considered for promotion to supervisory rank, must also demonstrate his willingness to accept a supervisory job, together with evidence that he possesses confidence that he can make good on the new job.

Management does not like to make mistakes here, since it is much easier for a man to accept promotion than demotion. The candidate must understand that he is taking over on a job in which the skill of his own hands is no longer the paramount concern. He must get his results through directing the efforts of others.

This is the stumbling-block for some skilled workers, who know they can continue to produce satisfactorily on their present jobs, but are not sure how they would make out as boss man. It is quite possible that Mr. Greenough at one time entertained similar misgivings, but looking back now as a plant manager he appreciates what a mistake it would have been had he turned down that first promotion when it was offered.

The skilled worker should appreciate that such promotion is never offered until quite a few higher-ups have studied him for months or years as possible supervisory and managerial material. Part of the self-confidence he must possess to make good as a supervisor he can base on the fact that, after such careful study, he has been offered the supervisory post. Management is in a better position than he is to determine his potentialities, and you may be sure that the head office is not going to be at all happy if the new supervisor does not make good.

Furthermore, as illustrated in the record of Mr. Greenough, management is not looking just for a foreman, but for a man who has the intrinsic qualities of an executive. His brother-supervisors will, almost without exception, go out of their way to help him get the hang of the new job, appreciating as they do that not long before they had to make the same difficult transition from the work force to the management team. He will make some mistakes, but if he is the man for the supervisory job he will learn quickly from these and not repeat the errors. He can discuss various problems with his fellow-supervisors, and he can go to his superiors for aid when this is required.

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August, 1961



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Attachments Are Useful for Completing



a Part in One Operation

NOEL BRINDLE

The screw machine operator should avail himself, whenever possible, of the several new attachments that have been introduced.

When preparing for the manufacture of a component in the automatic screw machine the engineer should choose a method which will allow the part to be made in the least number of seconds. It is also his responsibility to eliminate a secondary operation, if possible, by the use of attachments.

In recent years several new attachments have been introduced, some of which can be used to complete a part in one operation. The engineer should avail himself of these attachments whenever possible. It may require considerable resourcefulness from the screw machine engineer to eliminate a secondary operation, but the results which are obtained will undoubtedly justify these particular efforts.

An example is shown in Figure 1 that would be considered, at first glance, as a simple part. It consists of a threaded portion and a $1/16$ inch slot at the opposite end. Adjacent to the slot is a $1/16$ inch groove. There are two factors which should be considered. First, the stock size is $1/4$ inch diameter, which would justify using a small machine and secondly, the overall length is shown as $4\frac{1}{2}$ inches.

The part could be made without any difficulty in a Brown & Sharpe No. 00 automatic screw machine if the overall length of the part were $1\frac{1}{8}$ inches or less. The cut-off tool could form the thread diameter close to the chuck followed by the cutting of the thread. The forming of the $1/16$ inch groove would occur

at the beginning of the cutting-off operation, after "feeding to stop." The part could then be picked up and slotted, using the standard slotting attachment. However, because of the $4\frac{1}{2}$ inch overall length, this method cannot be used. Even though the Brown & Sharpe 0G or 2G size machines were considered, it would not be possible to pick up a part $4\frac{1}{2}$ inches long and mill the $\frac{1}{16}$ inch slot.

It can readily be seen that this part could be made in a No. 00 automatic screw machine with the exception of the slotting. A secondary operation would be required to mill the slot.

As mentioned previously, if it is possible, a part should be made complete in the initial set-up and, referring to Figure 1, it will be noted that the part drawing could be relocated 180 degrees, and the slotted end would face the turret. This arrangement would allow a standard turret milling attachment to be used, which would mill the slot close to the chuck, followed by the feeding of the stock. The thread diameter could be formed from the front cross slide, followed by the

rolling of the thread, using a thread roll and holder mounted on the back cross slide. The vertical slide would be used to sever the finished part from the bar stock and also form the $\frac{1}{16}$ inch groove.

In considering the above method it should be realized that both the high and low speeds of the work spindle will be required, because the thread will be rolled at a slow speed, while the remainder of the operations, with the exception of the slotting, will use a high speed. For this reason, the spindle brake ordinarily used to hold the spindle stationary, while the slot is milled, will be replaced with a neutral position braking arrangement. This attachment is provided as optional equipment on the new No. 00 automatic screw machine.

The chuck sketch for this example is shown in Figure 2, diagram "A," and it will be noted that it is necessary to feed the stock through the turret to a special stop held in the opposite hole. In the front portion of the turret a support will be mounted, to provide rigidity while forming the thread diameter and rolling the thread, otherwise there

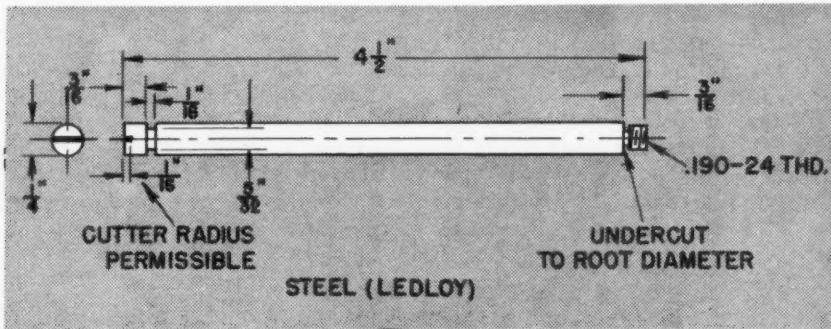


Fig. 1—Dimensional sketch of unusually long Ledloy steel automatic screw machine part.

Completing a Part in One Operation . . .

would be considerable deflection of the work.

Because of the length of the component it is not possible to feed to a stop, index the turret and introduce a support while forming, then index the turret and use another support while rolling the thread. Each of the above indexings would break off the part. No indexings can take place from the moment the stock is fed through the turret until the cutting-off operation has been completed.

Referring once again to the chuck sketch in Figure 2, diagram "A," the position of the turret is shown when the stock is fed to the special stop. For the circular form tool to form the thread diameter it will be necessary for the turret to drop back approximately $\frac{3}{4}$ inch, as shown in diagram "B." This movement will allow the form tool to advance into cutting position. The support will provide the rigidity which is required while the thread diameter is being formed.

After the forming operation has been completed, it will be necessary to relocate the turret support for a third time to allow the thread roll to come into contact with the formed diameter. It is shown in diagram "C" that the slot provided in the support allows the thread roll to advance into position, while the opposite side of the support prevents the stock from deflecting. Previously, the turret dropped back $\frac{3}{4}$ inch after feeding, but the turret has now advanced for $11/16$ inch, providing a clearance of $1/16$ inch between the end of the component and the

bottom of the stop. If this procedure were not followed, the end of the part would be rubbing on the bottom of the stop during the thread rolling operation, which would mar the piece part.

The order of operations, shown in Figure 3, will now be considered and "Feed to stop 5 times" is the first item listed. Referring to Figure 1, the overall length of the component is $4\frac{1}{2}$ inches and the No. 00 machine provides a 1 inch feeding movement using a 240 r.p.m. back-shaft speed, with greater lengths obtained by successive cycles. Therefore, 5 feedings will be required. The second item has been discussed previously, whereby the turret drops back and allows the circular form tool to advance into cutting position, as shown at "B" in Figure 2. Following the forming operation, the front slide tool will drop back $\frac{3}{8}$ inch and the turret will advance for a distance of $11/16$ inch as indicated at "C." The thread roll, located on the back slide, will advance and roll the thread. The movements just mentioned prior to the rolling of the thread are listed as "clearance" in the order of operations.

A neutral position braking arrangement will be required for this example, as stated previously. This standard attachment, furnished with the No. 00 size machine when specified, holds the work spindle in a stationary position while a cross drilling operation is performed or, as in this instance, when a slot is to be milled from the turret. If it were not necessary to use a slow

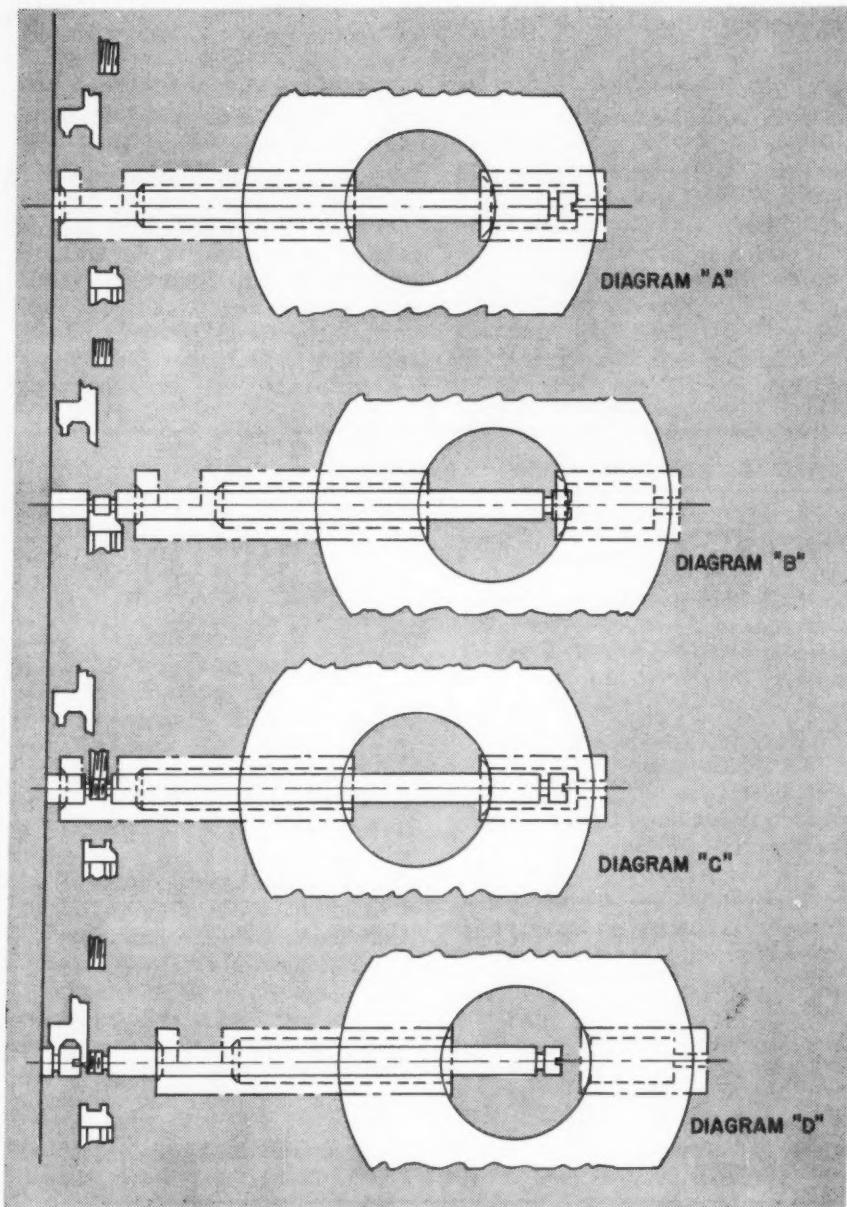


Fig. 2—Sketch showing chuck setup used for producing the workpiece shown in Figure 1.

Completing a Part in One Operation . . .

speed for rolling the thread, a spindle brake could be used.

When a high and a low speed is required, it is necessary to specify that a neutral position braking arrangement will be used. The functions of this attachment are as follows: "High speed" to "neutral," "neutral" to "low," "low speed" back to "high speed." For this reason, following the form operation at the high spindle speed, it will be

necessary to change to "neutral" and then to "low speed" for the rolling of the thread. A special thread roll will be used, held in a standard Brown & Sharpe thread roll holder.

When the thread has been rolled, the neutral position braking arrangement will change the work spindle speed to "high," for the cutting-off operation. However, clearance time will be required before the cutting-off tool can function.

REVS.	ORDER OF OPERATIONS	R.P.M.	SUR. SPEED	LENGTH OF CUT	FEED PER REV.	HDTHS.
95	Feed To Stop 5 Times (Index Turret) Clearance					6
72	Form Dw. & Support Front Slide Clearance, Change Speed	4305	281	.067	.001	10
95	Roll Thread Back Slide Clearance, Change Speed	760	38	.037	.003	8
89	Cut Off	4305	281	.107	.0012	
66	Cut Off & Form Dw. Vertical Slide Clearance, Stop Spindle, Index Turret	4305		.055	.0009	
120	Mill Slot	431	146	.072	.009	7
80	Index Turret 4 Times, Start Spindle					
617						31

TIME TO MAKE PART = 617 REVS. + 31 HDTHS.

$$\begin{array}{r} 100 \\ - 31 \\ \hline 69 \end{array}$$

HDTHS.

$$\frac{617 \times 100}{69} = 895 \text{ REVS.}$$

895 TOTAL REVS. = 12½ SECONDS PER PART

Refer to B&S Production Table for No. 00 Automatic Screw Machine in 4305 r.p.m. column. 897 Revs. = 12½ Seconds.

Fig. 3—Table listing the order of operations for producing the workpiece in question.

This clearance time will allow the thread roll to withdraw before the vertical slide blade advances into cutting position, as shown in diagram "D," Figure 2.

Included in the order of operations are two entries for cutting off the finished component. This arrangement will allow a normal cut-off feed to be used until the special blade commences to form the $1/16$ inch groove. At that time a reduced feed per revolution will be provided.

When the finished part has been severed from the bar stock it will be necessary to provide clearance time for the vertical slide blade to withdraw to its back position while the turret milling attachment is indexed into location. During this time, the neutral position braking arrangement will change from "high" to "neutral." This movement will effectively prevent the spindle from rotating while the slot is milled. The slot will be milled with a $1\frac{1}{4}$ inch diameter cutter, furnished with 60 teeth.

Referring to the turret diagram in Figure 4, it will be noted that it is necessary to index the turret 5 times after the slotting operation has been completed to bring the special support and stop in line with the work spindle. Therefore, sufficient time will be allowed to index the turret four times, while the fifth indexing will be overlapped into the first "feed out." It might be mentioned that it would not be possible to use the double indexing feature of the machine for this example because of the unusual length of the part, which would be prevented from dropping into the work pan placed by the bed of the machine.

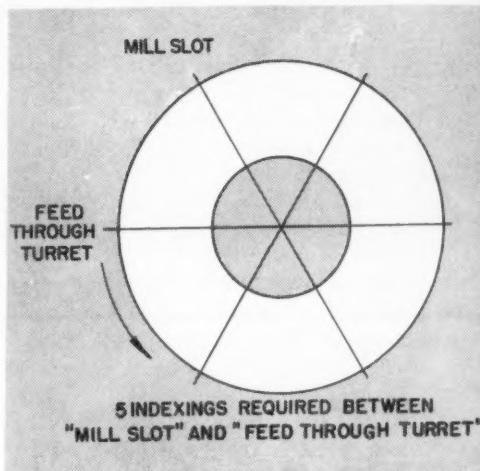


Fig. 4—Diagram of the turret setup used in milling the slot in one end of the workpiece.

Diagrams are shown in Figure 5 to illustrate how the clearances discussed previously were prepared, using standard Brown & Sharpe lever templates. This information will be used when determining the number of seconds required to produce this example.

Ledloy steel is specified for the workpiece in Figure 1 and a surface speed of 300 feet per minute is recommended. An available speed of 4305 r.p.m. has been chosen, which provides a surface speed of 281 feet per minute for the forming and cutting-off operations.

When rolling a thread on Ledloy steel, it is customary to use a spindle speed approximately one-fifth of the high speed, and 760 r.p.m. has been selected.

The turret milling attachment for the No. 00 automatic screw machine is furnished with two cutter speeds

Completing a Part in One Operation . . .

of 431 r.p.m. and 1725 r.p.m. For this example the speed of 431 r.p.m. will be chosen, which will provide a conservative surface speed of 146 feet per minute.

The elements of time required for the various items shown in the order of operations in Figure 3 will now be considered and, from this

information, the seconds per part will be determined.

To provide for 5 feedings, 95 revolutions will be required. This information can be obtained from the production table for the No. 00 automatic screw machine, using a 240 r.p.m. driving shaft speed. It is shown that 18 revolutions will be

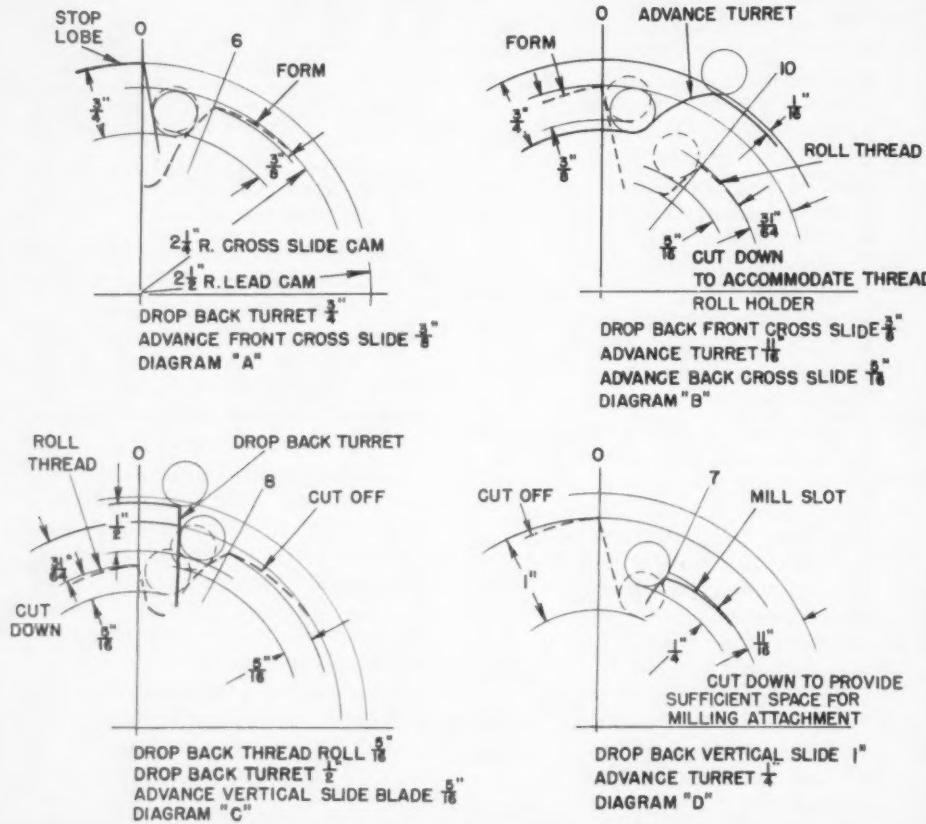


Fig. 5—Diagrams show how clearances were prepared using Brown & Sharp lever templates.

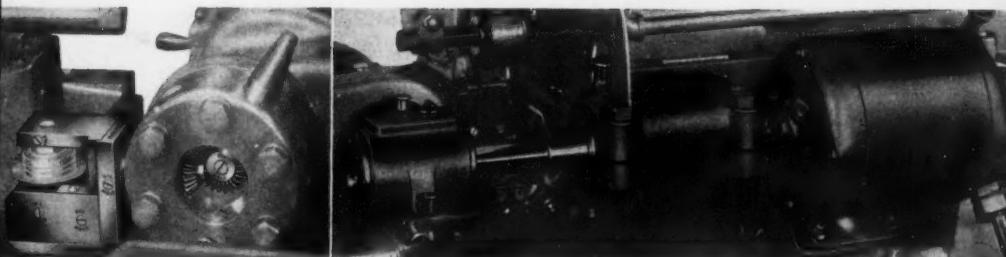


Fig. 6—Turret milling attachment in which master bevel gear furnishes drive to small gear.

required to feed the stock or index the turret, based on a high speed of 4305 r.p.m. This figure of 18 revolutions will be multiplied by the number of feedings required and five extra revolutions added.

For the next item, a reference to diagram "A" in Figure 5 will show that 6 hundredths of cam surface will be required.

The **threaded portion** will be formed to a mean class 2 tolerance of the pitch diameter for a 0.190-24 thread. This equals 0.1602 inch. It is also necessary to form to a root diameter of 0.136 inch. The 72 cutting revolutions shown for the forming operation will be obtained by subtracting 0.136 inch from the stock diameter, dividing by 2 and adding 0.010 inch for approaching the work. This will equal 0.067 inch as the length of cut. A feed per revolution of 0.001 inch per revolution will be divided into the length of cut and 5 extra revolutions added.

In diagram "B," Figure 5, 10 hundredths of cam surface is shown as the clearance required between the forming and thread rolling operations. This information is added to the order of operations in Figure 3. During the clearance time just mentioned, the neutral position

braking arrangement will function, changing from "high" to "neutral" to "low." This will provide the low speed required for rolling the thread.

The length of cut required to roll a thread equals the sharp single depth plus an approach of 0.010 inch. A feed per revolution of 0.003 inch has been chosen and is divided into the throw of 0.037 inch. This amount equals 12 revolutions and 5 extra revolutions are added as a safety factor. The 17 revolutions are multiplied by the ratio between the high and low speed, which is 5.6 to 1. This explains how the 95 revolutions shown for rolling the thread were obtained.

It will now be necessary to provide clearance time to allow the thread roll to withdraw while the special combination cut-off and form blade advances into position. Diagram "C" in Figure 5 shows that 8 hundredths of cam surface will be required.

Two feeds per revolution will be provided during the cutting-off operation. While the total length of cut equals 0.162, only 0.055 inch will be used at the slower feed, when the 1/16 inch groove is formed. The total throw is obtained by adding 0.010 for approach and one-

Completing a Part in One Operation . . .

half the stock diameter, plus the depth of the angle on the cut-off blade, which equals 0.022 inch in this instance, also 0.005 inch for the heel of the blade to pass the center line of the spindle.

Following the cutting-off operation, it will be necessary to provide clearance time for the vertical slide blade to be withdrawn, while the turret milling attachment advances for a distance of $\frac{1}{4}$ inch. Diagram "D" in Figure 5 indicates that 7 hundredths of cam surface will be required. During the clearance movements described above, the neutral position braking arrangement will change from "high" to "neutral," preventing the spindle from rotating while the slot is milled.

As mentioned previously, the slotting cutters will rotate at a speed of 431 revolutions per minute. The ratio between the work spindle speed

of 4305 r.p.m. and the slotting speed equals 10 to 1 approximately. The depth of the slot is shown in Figure 1 as $\frac{1}{16}$ inch and 0.010 inch will be added for the approach.

To determine the feed per revolution of the cutter it has been assumed that each tooth will remove 0.00015 inch. The 60 teeth in the cutter will advance for a distance of 0.00015 inch multiplied by 60, or 0.009 inch for each revolution. The 0.072 inch length of cut is divided by 0.009 inch, which equals 8 revolutions. Four additional revolutions are provided for a dwell to clean up the cut. The 12 revolutions are multiplied by the ratio between the high spindle speed and the cutter speed, which is 10 to 1. The revised revolutions will equal 120.

The last item shown in the order of operations refers to the 4 indexings of the turret and they are required to bring the special support and stop into line with the work spindle. According to the production table for the No. 00 automatic screw machine, 18 actual revolutions will be required to feed stock or index the turret, based on a high speed of 4305 r.p.m. This figure of 18 revolutions will be multiplied by 4 and a few extra revolutions added. During this time the neutral position braking arrangement will function as follows: "Neutral" to "low" and "low" to "high", in preparation for forming operation on next part.

The turret milling attachment is shown in Figure 6 and it will be noted that a master bevel gear furnishes the drive to the small gear. The nut holding the small gear de-

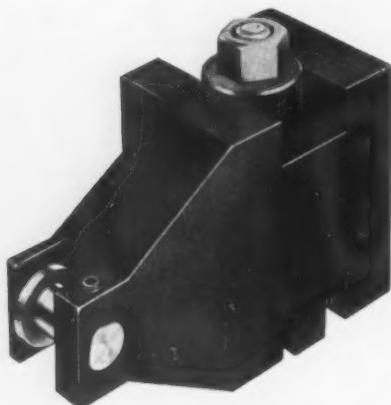


Fig. 7—View of Brown & Sharpe thread roll holder adjusted for use on back cross slide.

termines the largest size of stock that can be accommodated. The $\frac{1}{4}$ inch stock used for this example is the maximum size that can be fed through the turret without interfering with the nut for the small bevel gear.

In this example, where the stock is fed through the turret support, there is a possibility that the part will not always "drop out" when the turret is indexed, following the cut-off operation. When this trouble occurs, the hole size in the turret support may be increased or the cutting oil changed. Substituting nylon instead of steel feed finger pads could also be considered to eliminate possible feed finger scratches which might have a tendency to prevent the free ejection of the finished part.

On the No. 00 automatic screw machine the distance between the center of the tee slot on the tool post and the center of the circular tool equals $1\frac{5}{16}$ inches. However, the distance between the tee slot and the center of the $1\frac{3}{4}$ inch diameter thread roll used on a Brown & Sharpe thread roll holder is $1\frac{51}{64}$ inches. For this reason a cut down equal to the difference between $1\frac{51}{64}$ inches and $1\frac{5}{16}$ inches is required on the back cross slide cam. The holder is shown in Figure 7.

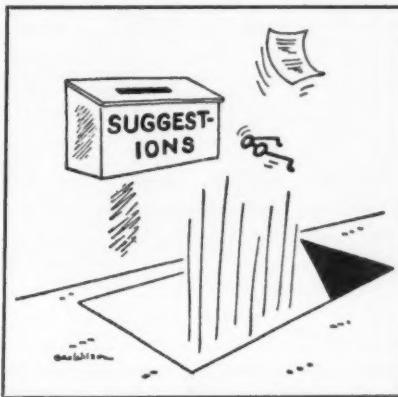
When using a turret milling attachment, a unit is now available, from the Brown & Sharpe Manufacturing Company, which allows the cutter to rotate during the slotting operation only. For the remainder of the cycle the cutter is stationary to prevent a possible accident. The unit consists of a

micro-switch which is actuated by a disc cam, located at the extreme left end of the front shaft.

The neutral position braking arrangement requires a sufficient number of spindle revolutions to allow the attachment to change from "high" to "neutral". The revolutions are based on the spindle speed to be used. For this example, using a spindle speed of 4305 r.p.m., 32 revolutions are required, which are overlapped into the clearance time. It might be mentioned that 150 revolutions should be allowed when the high speed of 7200 r.p.m. is to be used.

Conclusion

This example has been presented to show why various methods should be considered when planning for the manufacture of a component in the automatic screw machine. The engineer with a knowledge of the machine and an understanding of the available attachments will obtain a sense of fulfillment when an unusual job of the type presented in this article is carried to completion.





Close-up view of True-Trace Mark II-A tracing attachment as used for machining of rim contour in magnesium race car wheel. Template located in circle formed by hose line in lower right.

Tracing attachment increases wheel production and reduces magnesium fire hazard.

By TED HALIBRAND
Owner, Halibrand Engineering Company

As one of the world's largest producers of magnesium wheels for sports and Indianapolis-type racing cars, increased production of these wheels and reduced fire hazard of machining magnesium have always been two of our major concerns. After many years of trial and error, these benefits were realized

by us when we installed a True-Trace Mark II-A tracing attachment on a 19-inch LeBlond lathe. This new combination performs in one pass, with one tool, the work done by four different tool changes with former methods.

In our old method of machining magnesium wheels for race cars,

work was done by hand feeding and changing four special cutting tools required for each contour profile of the rim. Each cutting tool cost \$15 and had to be re-sharpened frequently, with constant need of replacement. This hand feeding method placed a great deal of physical and nervous strain on the operator as he struggled to maintain tolerances and proper speed rates to avoid magnesium fires. Since we installed the True-Trace Mark II-A tracing attachment, finishing is now done in a single pass using but one carbide-tipped cutting tool and a KDK toolholder, holding close tolerances.

In the majority of our runs, half of the rim is finished and then turned around to complete the other half. If the contour of the rim is different half-to-half, one half of the entire job is run, the template changed and the other half of each rim is finished.

The True-Trace attachment permits speeds of 625 r.p.m., feeds of from 0.018 to 0.024 inch and cuts from $1/16$ to $1/8$ inch. Under these conditions, wheel rims are machined to a good smooth finish and the constant speed and feed rate as opposed to the variables of hand operation have eliminated the fire hazard of machining magnesium. Under this new method, our operators say they don't get nearly as tired.

Our finishing operations, which formerly required a converted brake drum turning machine, filing and sand papering and was the source of many magnesium fires, have been completely eliminated with the one-pass machine and finish operations

of the True-Trace attachment. Time studies, which are a continuing part of our business, show that elapsed work time per rim is now 6 minutes floor to floor as opposed to 15 minutes per rim under the former method.

Summing it up, this new combination has increased production by 150 percent, reduced production costs from 60 to 70 percent, eliminated costs of special tools and equipment, reduced operators' fatigue and eliminated the fire hazard involved in machining magnesium.



Ted Halibrand (left) and George Salik check out a Halibrand-produced magnesium wheel on the race car which was driven by Chuck Stevenson in the 1961 Indianapolis "500."

Automatic Drilling of Small Diameter Deep Holes

An effective method for drilling holes in oxyacetylene burning tips is outlined.

By C. B. WEIDNER

The plight of a manufacturer faced with the production of many thousands of oxyacetylene burning tips was predicated upon his ability to perform the operations shown in Fig. 1. A scrap rate of 20 to 25 percent coupled with a steadily rising backlog of undelivered orders called for fast positive action.

The part was drilled on a special built machine which rotated the tip about the axis of the hole to be drilled and at the same time the drill was rotated in the opposite direction to achieve a s.f.p.m. figure of 80. The success of the operation

depended upon the operator's feel of the drill action as it was fed into the tip by hand. The best of operators had frequent "off days" in which their feel did not work to their advantage. Production was low. A good day might produce a maximum of 35 good parts per operator, but good days were not the rule. The scrap piled up due to broken drills or holes which did not break through in the proper area.

One big item which might influence any decision was the fact that a competitor had expended many thousands of dollars in an unsuc-

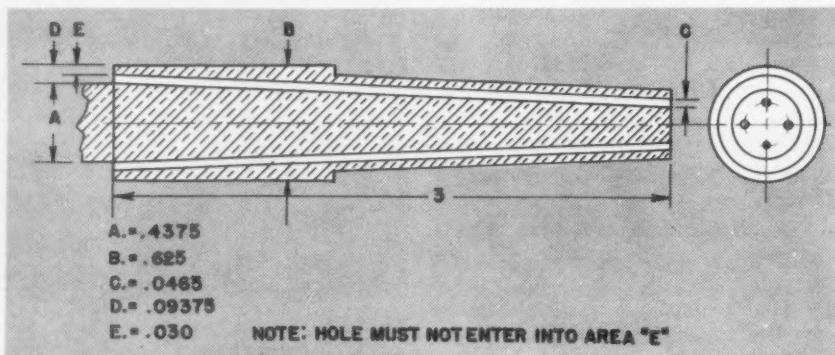


Fig. 1—Cross-sectional sketch of oxyacetylene burning tip to be drilled as indicated.

cessful attempt to mechanize a similar operation. In spite of this fact, the recommendation was made that special machinery be designed to mechanize this operation. The funds for this program were eventually approved.

A thorough study of the problems involved set forth the following design criteria:

1. Spindle speeds must be steplessly adjustable from a point well below the recommended surface feet per minute of the drill to a point well above the recommended rate. This was accomplished through the use of an adjustable governed speed motor with speeds from 2500 to 15,000 revolutions per minute.

2. The feed rate must be steplessly adjustable through a very wide range. This was accomplished by using an air cylinder to power the drill thrust and control the rate of motion with a hydraulic cylinder acting as a check against the air cylinder thrust. An adjustable flow control valve on the exhaust side of the hydraulic cylinder produced an adjustment from 0 to 50 inches per minute.

3. Chip removal must be a prime consideration of any design. To gain every advantage in this phase, it was decided to drill the part in a vertical position with the drill entering from the bottom. This allows the laws of gravity to go to work in your favor. It is an old and tried method which is too frequently overlooked.

4. The drill must have the best bushing system which can be designed. The slenderness ratio of the drill being of such a high value is another item which must not be

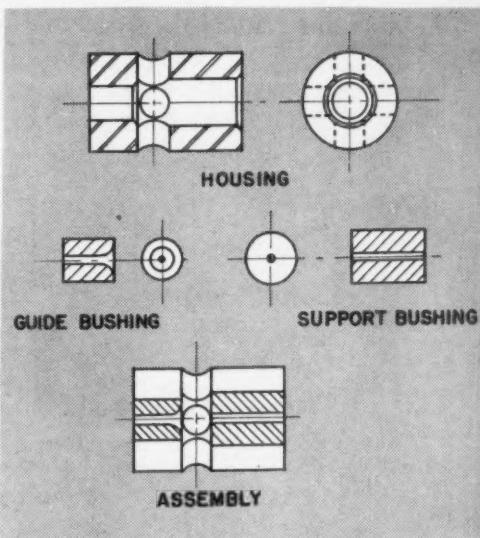


Fig. 2—Breakdown of the bushing designed for use in drilling the holes in burning tips.

overlooked. The drill is actually 5½ inches in length.

The major factor contributing to the success of the machine is the bushing. The design is most unusual. It is based upon several actual tests and performs all of its desired functions to the utmost.

Figure 2 shows a breakdown of the bushing used. It is actually composed of two separate bushings inserted into a housing to form an integral unit.

Figure 3 illustrates the manner in which the bushing is applied to the work. The drilling proceeds from the bottom upward. Since it is not possible to drill this hole in one pass, the drill will have to be withdrawn from the work after a relatively short distance of penetration. The drill will also have to be completely withdrawn from the guide

Automatic Drilling of Small Diameter Deep Holes . . .

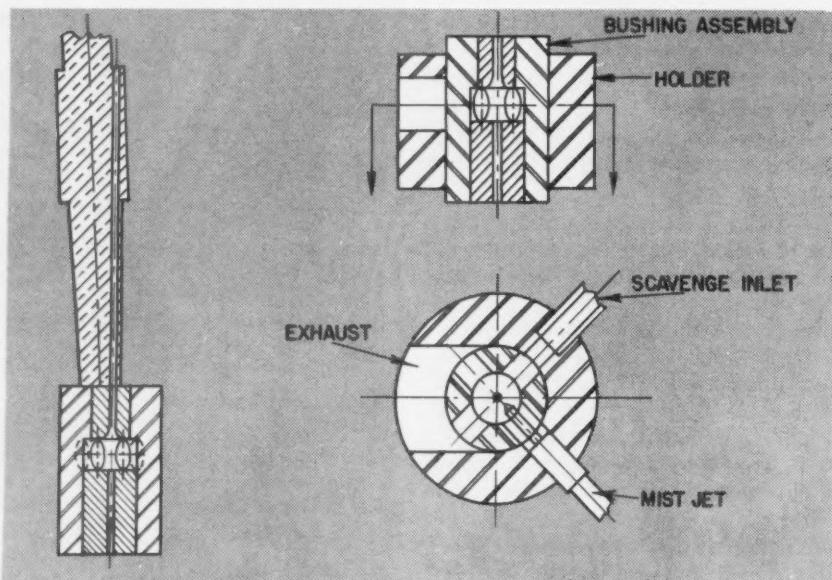


Fig. 3.—(Left) Sketch showing the manner in which the bushing is applied to the work. (Right) Cross-sectional sketch showing the bushing assembly in position in its holder.

bushing to allow for removal of all the chips. The drill remains in the support bushing at all times. This prevents the drill from whipping as it would do if a support bushing was not used. The support bushing also imparts a stiffening action to the drill during the drilling cycle.

Figure 3 also shows the bushing assembly in its holder. There are several additional advantages to this type of bushing which are illustrated in this sketch. The four cross holes drilled in the bushing housing are there for a purpose. The scavenge inlet is connected to the exhaust of the drill feed cylinder thrust stroke. This high pressure air is directed into the bushing and

across the drill while it is being retracted for chip clearance. This feature uses the waste air to blow the chips out from the drill flutes through the exhaust part of the holder. The mist jet is the retract side of the drill feed cylinder exhaust. The waste air in the retract side is used to spray an air and oil mist on the drill for the full feed stroke. Thus, even the used air is put to a secondary use.

The machine worked well on the initial start-up. The cycle time for the drilling of one hole is about 50 seconds. A total of 40 to 44 pecks are used to drill one hole. The drill is run at 12,500 r.p.m. The accuracy of the original design criteria con-

cepts was well proven by a rather severe test. A No. 78 drill (0.016 inch diameter) was used to drill four holes in a test piece. The accuracy of the break through was as great as that of the larger drill. Time for a No. 78 drill per hole was 3½ minutes. This is a diameter to length ratio of 1:187.5.

The production setup of the machine is: One operator runs 7 machines. Production is 35 per cent greater than the previous 14 operators and scrap is a maximum of 2 per cent.

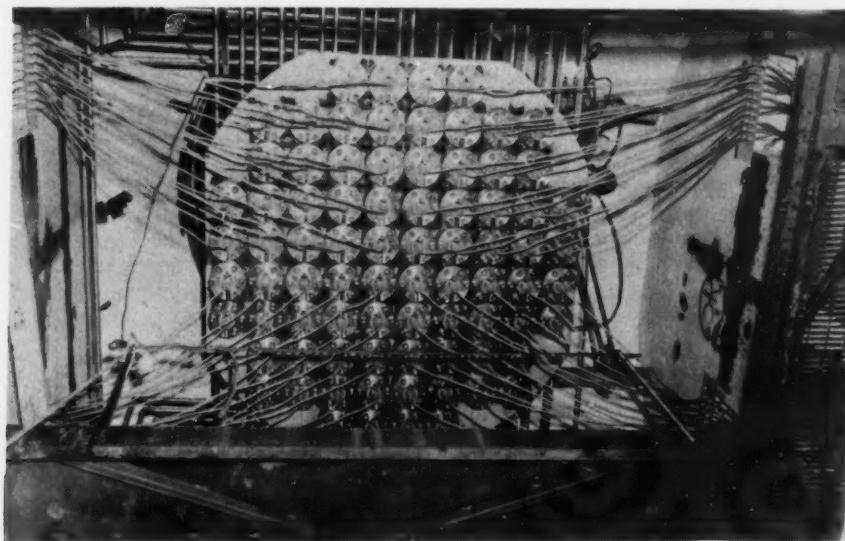
★ modern machine shop ★

Reactor Part for Nuclear Power Station

The Columbus Die, Tool and Machine Company, Columbus, Ohio, supplied the thimble locating plate shown here for the atomic

reactor at Commonwealth Edison's Dresden Nuclear Power Station, near Chicago. The thimble locating plate, located at the bottom of the reactor vessel, contains 80 precision-placed holes. Each hole aligns a flange of a thimble which holds a control rod in line with the bottom of the reactor core. The part accurately guides the control rods into and out of the reactor core, controlling rate of chain reaction. When inserted in the core, the rods, each containing 2 percent boron, absorb neutrons and reduce reactor reactivity. When withdrawn, they permit increased reactivity.

The 300 ton reactor pressure vessel in which fissioning takes place, is located in the center of a giant 190-foot steel sphere. The thimble locating plate is circular in shape, with a 9-foot diameter, and is made of 1½-inch thick steel plate.



In use, the thimble locating plate must line up perfectly with the control rod thimbles.

Pre-Planning



Here a service mechanic is shown being handed a work assignment that was removed from its scheduled place on the daily work

assignment board. Note "tear off" sections of assignment cards remaining on board which indicate an assignment is in progress.

**Sensitive Job Assignment Control has resulted
in overall efficiency increases of up to 40 percent
in aircraft overhaul and modification departments.**

By W. L. WHITTIER
Works Manager, Long Beach, California Division,
Douglas Aircraft Company

Speeds Job Assignment Work

A new and very comprehensive method of pre-planning each work job before it is assigned has resulted in overall efficiency increases of up to 40 percent in the departments where the new system is being used at the Long Beach, California Division of Douglas Aircraft Company. Called a "Sensitive Job Assignment Control System," the technique has two main objectives—to ascertain that a man can do a job before he is given the assignment, and to eradicate all reasons why the job can't be done in the estimated time.

Sensitive Job Assignment Control is now being used in the Overhaul and Modification Departments, on certain Plant Engineering and Maintenance Projects, and experimentally in certain production departments. As the word "sensitive" implies and to a greater extent than ever before, every concrete or abstract factor that may influence the completion of the work within an allotted time and in accordance with budgeted costs is pre-considered before the assignment is handed out. Such factors will include the availability of parts, free access to the area or space where the work must be performed, the assurance that all necessary prior work has been accomplished, and the availability of necessary tooling and equipment.

In analyzing the above factors as they pertain to Sensitive Job Assignment Control, it is obvious that parts and materials must be

available at the time the assignment is made or the work cannot proceed, and the estimated time on the job will suffer accordingly. Secondly, when a mechanic or production worker receives an assignment, he must have access to the area or space where the work must be accomplished. If, for instance, an electrician arrives in a restricted space or area to make his installation, and discovers that other workers are there ahead of him, there is nothing for him to do but wait.

Third, some jobs are progressive in nature, making it necessary to complete one part of the work before the next is started. With Sensitive Job Assignment Control, assurance is made that all necessary prior work has been completed before the assignment is handed out. And as with parts and materials, the availability of both tools and equipment is necessary before the job can start.

In many instances, the sensitivity of this new job assignment control system will detect beforehand, and thus eliminate unnecessary work. As an example, in an airplane modification job, several different installations in the cockpit may require removal of the pilot's seat. A complete set of instructions on any one of the assignments would call for both removal and re-installation of the pilot's seat. But by detecting beforehand that several installations must be made with the pilot's seat fully removed, the work can be scheduled so that only one removal and one re-installation are necessary.

"... success hinges on cooperation between all departments."

As might be expected from the foregoing discussion, success of the Sensitive Job Assignment Control System hinges on the ultimate in cooperation between all departments which have anything to do with the work. The overall job must be broken down into a series of job assignments which dovetail neatly and fall in the proper sequence.

In using the system at Douglas, a "Definition of Work" is made available for each job. This is in reality a "master plan," so to speak, furnishing all the information necessary for detail planning. It lists everything to be done on a job, along with the parts and materials required, the tools and equipment needed, and the time allotted for job completion.

Next, representatives from all departments which will have anything to do with the job study this master plan (or "job package" as it is sometimes called). The overall job is first broken down into work increments of eight or less hours each so that each production worker or mechanic will receive at least one work assignment during each work-shift. This eliminates extended work assignments which tend to "drag out" and are much more difficult to control.

These work increments or job assignments are then arranged in the order in which they must be accomplished and scheduled over a period of time equal to the estimated time required for the overall job. Here is where the "sensitivity" of this new system comes into full play. If, for instance, one assign-

ment calls for 32 manhours of work, but must be completed during an eight-hour shift so that other work can progress on schedule, it is immediately obvious that at least four men must be assigned to do the job. When a hydraulic installation must be sandwiched between a structural addition and an electrical installation, it is immediately obvious and can be scheduled accordingly.

It is also during the generation and scheduling of these specific work assignments that the representative from each participating department notes and times his own responsibility in conjunction with the scheduled completion of the job. The production control man will be forewarned as to when and where parts and materials must be available; the service shop or production foreman will note the skills required and when they must be available. The time standards man may note that, when considering other facets of the work, his job time estimates may need a revision and he can do so at once, thus avoiding schedule "bottlenecks" later on.

After the specific work assignments have been generated, co-ordinated and scheduled (each on one of the "Job Description Cards" shown herewith), they are placed in the scheduled sequence in visual cardex pockets extending across a daily work assignment board. When a job assignment is made, the card is removed from the pocket, leaving its "tear off" bottom portion as immediate visual evidence that the job assignment is in progress. The work assignment card is then punch-

ed out. When the assignment is completed, the mechanic returns the card to the board operator who again time-punches it. The "tear off" section is then removed from the board, stapled to the original assignment card, and the card is filed in a "Ready for Inspection" box.

If and when additional and unpredicted work is necessary which will require additional man-hours, parts, materials, or tools, it is entered on one of the "Job Write Up" cards shown herewith. This unexpected work is then properly evaluated and the Job Write Up card is inserted at an appropriate place in the line schedule of Job Assignment Cards. Thus, the unscheduled work can be loaded into the daily work assignment program without disrupting the schedule.

Psychology as well as careful pre-planning contributes to the success of the Sensitive Job Assignment Control system. When a production worker or service mechanic receives a work assignment along with its estimated time requirements, and when he as well as everyone else knows that careful pre-planning has eliminated all obstacles to its accomplishment, it becomes a matter of personal pride to finish the work within the allotted time. Failure to do so will usually be substantiated by a logical reason.

Basically, then, Sensitive Job Assignment control means bringing together all elements concerned with a job so that they may be carefully studied, correlated, and pre-planned long before the work assignment is handed out. It means the breaking of the total job down

FORM 31-226 (4-61)				JOB DESCRIPTION CARD			
APL. NO.		ASSEM. NO.		EMPLOYEE NAME		NO.	
DATE	TIME	DAILY TOTAL		ASSEM. TITLE	CHART NO.		
JOB DESCRIPTION							
ACTUAL HOURS		LEADMAN BUY OUT		REMARKS:			
STANDARD HOURS							
NAME		OPER. NO.	SKILL	MANLOAD	1 OF	AREA	CHART NO.

JOB DESCRIPTION CARD—actually the assignment card with its "tear off" section.

"... it provides the workman with a paved road . . ."

FORM 65-443 (12-60)		JOB-WRITE UP		SHIP NO.	SERIAL C 1612
JOB NO.	S.O.	CAT.	POS.		
AREA	SKILL	CAT.	POS.	OFF ON OFF ON OFF ON OFF ON	SERVICE EST. TOTAL ACTUAL HOURS STANDARD HOURS
JOB NO.		S.O.	CAT.	POS.	SERIAL C 1612

JOB WRITE UP CARD—used to insert unscheduled and unpredicted work into scheduled time.

into small and easily controllable work increments which can be fitted together like parts of a puzzle to produce a desired work pattern.

Above all, it provides the ultimate workman with a paved road covering the shortest distance between

two points—the start and finish of his assigned job . . . a road without detours, easy to travel, but minus the many curbside attractions which can affect a rigid schedule. Once upon this road, there is no excuse for stopping until the end is reached!



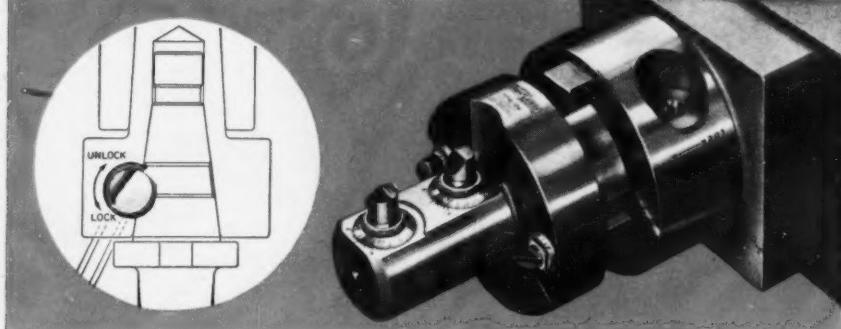
Mechanization of Motion. By Lee Harrisberger. Published by John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, New York. 361 Pages. Price, \$8.50.

This book is primarily intended to present rational procedures for the synthesis of mechanisms. It combines the fundamentals of kinematics, the techniques of ideation, and new techniques of analysis. This combination is presented as a step-

by-step discussion of logical procedures for synthesizing mechanical systems in order to satisfy any motion requirement. As an introduction to engineering analysis, it presents a fresh approach to the teaching of kinematics—one that imparts meaning and purpose to the technology—and, in so doing, introduces the reader, for the first time, to the process of creating designs which definitely satisfy a realistic need.

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Computer Program Aids In . . .

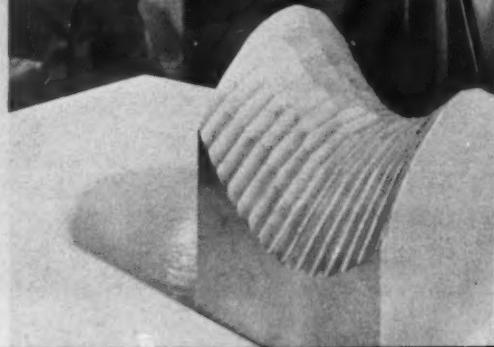
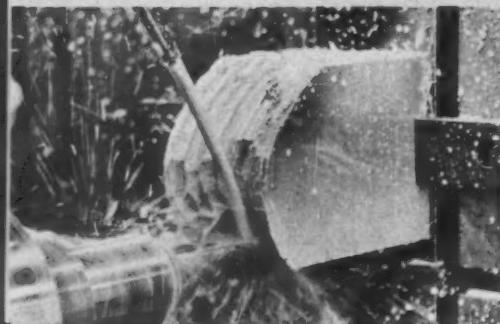
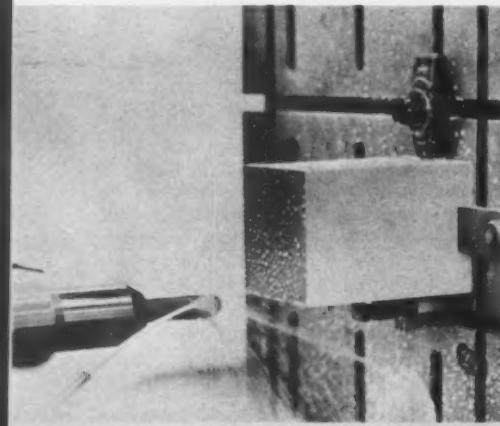
Developing Numerically Controlled Machine Tool Instructions

Autopromt (Automatic Programming of Machine Tools); a program which generates the tool paths required to mill complex three-dimensional surfaces with a

numerically-controlled machine tool, was announced recently by its developer, the International Business Machines Corporation. These tool paths are produced by a com-

Controlled by instructions generated by IBM's Autopromt, a Pratt & Whitney Numeric-Keller continuous-path milling machine shapes a raw aluminum block (upper left) into the saddle-shaped piece shown at right. Upper left: Numerically controlled tool head approaches

aluminum block for first bite. Lower left: Aluminum chips fly as tool follows cutting path generated by Autopromt and part takes shape. Right: Engineer inspects perforated tape containing computer-generated instructions that guided the milling operation.





Numerically controlled machine tool cuts surface of helicopter gearbox cover, the first practical shop job ever performed using IBM's Autopromt. A computer, controlled by the Autopromt master program, automatically generates the paths a tool must follow to mill the complex three-dimensional surfaces

of the part. The programmer provides a description—in English-like Autopromt language—of the part to be milled and the tool to be used. Computer-generated instructions are converted to perforated tape or any other suitable medium for use by the numerical control device that guides the machine tool.

puter in the form of thousands of detailed numerical instructions to the machine tool. These instructions include essential information such as tool bite, feed rate and any other data a numerically-controlled machine tool requires.

Working from an engineering drawing of the part, and with a knowledge of the tool that will perform the machining, the part-programmer writes a series of statements in the Autopromt language. The language contains 110 English words that describe such shapes and surfaces as cone, cylinder, hyper-

bolic paraboloid, sphere, and taurus. It also contains words that designate the relationships between surfaces such as angle, axis point, intersection of, and surface point.

The programmer describes each of the surfaces of the shape to be machined, defines the relationships of these surfaces to each other and specifies the machining requirements such as tolerance and tool size. This information is punched into cards and fed into a computer. Also fed into the computer, for storage in its memory system, is the Autopromt program. This series of

Machine Tool Instructions . . .

more than 30,000 instructions enables the computer to generate automatically from the source program, the tool paths necessary to operate the numerically-controlled machine tool.

Under control of the Autoprompt processor, the computer translates the language of the Autoprompt into suitable computer codes, simulates within itself the surfaces and boundaries to be milled and then calculates the detailed tool travel instructions for each machining region. The computer then edits these tool travel instructions according to the

special requirements of the numerical control equipment being used. This editing is performed by an auxiliary program called a post-processor. The post processor is designed to take into consideration features peculiar to particular machine tools, such as chip-removal mechanisms or multiple tool heads. Machine tool characteristics such as overshoot and rate of turning a corner also are handled by the post processor. Autoprompt is written for compatibility with various types of post-processors and the program may be used on the IBM 704, 709 or 7090 computers which are readily available at service centers.

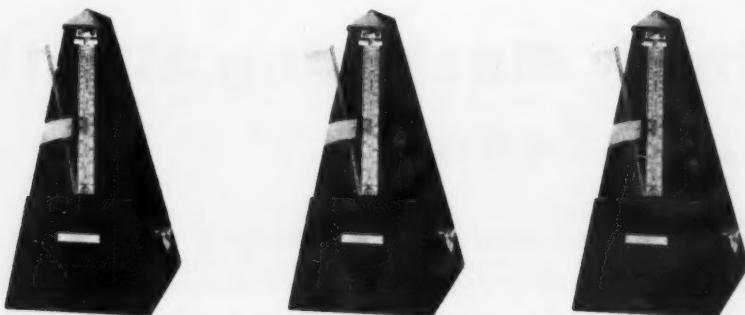


Atlas Lathe on Display at Cairo Exhibition

Farmers from the United Arab Republic examine a lathe made by the Atlas Press Company of South Bend, Ind. The lathe was displayed as part of a farm workshop area

in the United States Exhibit at the International Agricultural Exhibit in Cairo, Egypt. At left in the illustration is Milton E. Slater, Executive Assistant to the President of the Thor Power Tool Co. of Aurora, Ill. Third from left is Donald Dobson of the International Cooperation Administration. The Cairo Exhibition, opened in March, was expected to draw more than a million visitors before its scheduled closing a month later. The American exhibit, viewed by U.A.R. President Gamal Abdel Nasser on his opening-day visit, was a joint undertaking of the Department of Agriculture and Department of Commerce Office of International Trade Fairs.





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With these three metronomes—or with a thousand—the time interval you choose can be positively duplicated time after time after time. And with these three **CINCINNATI** surface wheels—as with all **CINCINNATI** GRINDING WHEELS—you'll get the same kind of Positive Duplication *every time!*

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August, 1961

MODERN MACHINE SHOP 109

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Finish Machining Missile Nose Cones

Dual-motor belt sanders halve finishing time on crucial nose cones of Nike-Hercules atomic-warhead anti-aircraft missiles.

The hard nose of the U.S. Army's ground-to-air defense system is speedily polished with dual-motor belt sanders developed by the Rotor Tool Company of Cleveland. In use at the Avco Corporation's Lycoming Division, Startford, Connecticut, the belt sanders have halved finishing time on the crucial nose-cones of Nike-Hercules atomic-warhead anti-aircraft missiles.

Production figures are necessarily classified but Lycoming engineers agree that use of the M1194 Rotor belt sanders has cut nose cone finishing and polishing operations by 50 percent, with corresponding economies in costs and labor and increased production. The high speed, durable sanders have also cut down handling time since they combine in one pass what was previously accomplished in three separate applications of rough-cutting, turning and polishing. Before the belt sanders were drafted for this defense work, some finishing operations were done by hand.

Although the nose cones are manufactured from special aluminum stock, Lycoming engineers found that the versatile sanders can be

used on several metals simply with a change of belts. Avco's Lycoming Division has also successfully used the belt sanders to finish off other defense hardware it manufactures. Avco has been awarded the prime contract for design and development of the re-entry vehicles for both the Titan and Minuteman intercontinental ballistic missiles, with production of both vehicles assigned to Lycoming. Other missile components produced by Lycoming, under sub-contract, include diffusers for the Talos, second stage rocket chambers for the Minuteman, and components for the Bullpup and the Saturn.

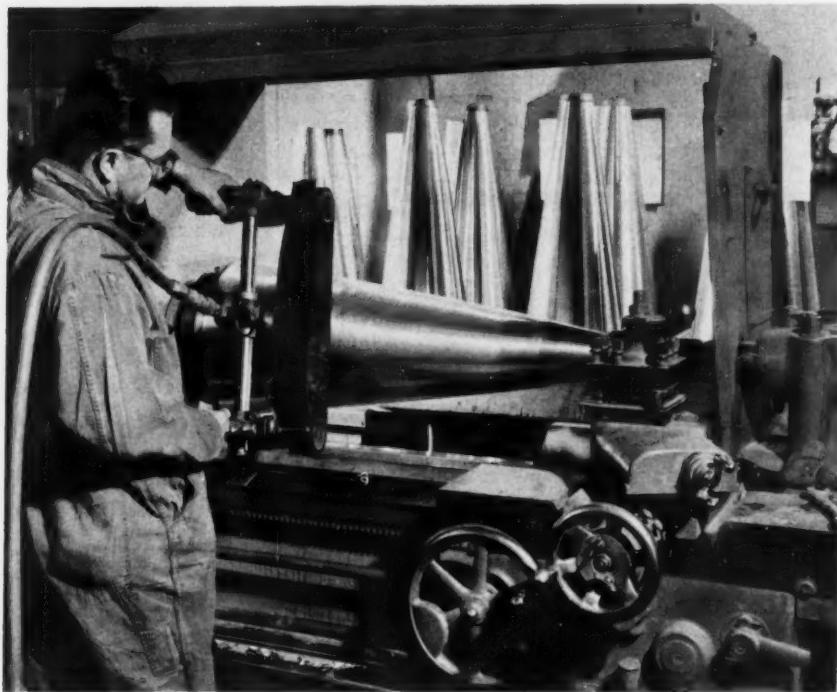
The Nike-Hercules is the U. S. Army's prime atomic defense against air attack. Nose cones of this radar-guided missile are produced by Lycoming's own Hydro-spinning method. The missile head begins as a flat "blank" of 6061 aluminum of $17\frac{1}{2}$ -inch diameter and $\frac{1}{2}$ -inch thickness. The blank is pre-formed on a Cincinnati Hydro-form machine and three subsequent spins on a Cincinnati Hydrospin produce the properly shaped part. (Lycoming's Hydrospin is one of the world's largest, and has been

adapted to handle components of 5 feet in diameter. A yet larger vertical machine soon to be operational, will be able to handle cylindrical and other shapes 72 inches in diameter and 144 inches long.)

The wall thickness on the Nike-Hercules nose-cone tapers from 0.125 inch at the large diameter to 0.078 inch on the small or "business" end. Thickness is held to very close tolerances. Precision is essential to maintain the absolute balance of the total missile. VidiGage sonic testing is applied to the nose-cones after the second and third spins

over the Hydrospin mandrel and after final finishing with the Rotor belt sander. In this final operation each cone is placed upon an automatic spinning lathe which operates in a clockwise direction. The sander operators counterclockwise.

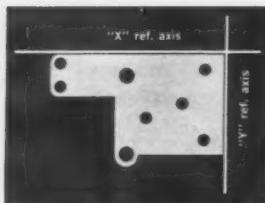
The sander consists of a bar and hand-operated trigger mechanisms which actuate and control each of two motors which drive 2-inch wide wheels of 3-inch diameter. The wheels, in turn, propel the 2 x 45-inch sanding belt which performs all of the necessary finishing tasks on the missile nose cone.



To final finish, the nose cone is placed in an automatic spinning lathe (which operates in a clockwise direction) and is finished with a belt sander (which operates counterclockwise).



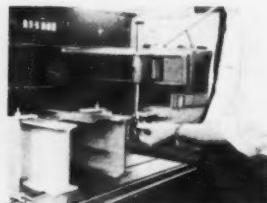
Sheffield Ferranti FI-22 locates holes to within .001" faster than you can read this



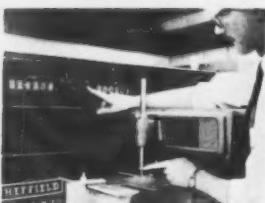
1. The problem: locate the holes in this piece to within .001". Here's how it works.



2. Mount and clamp workpiece to table. Working range of table is 15" by 24".



3. Insert flat probe for aligning and locating reference edges of work piece.



4. Move spindle along "X" axis until probe touches reference edge, and push zeroing button. Repeat for "Y" axis.



5. Replace flat probe with suitable tapered probe. Interchangeable tips available for a wide range of hole sizes.



6. Move spindle over piece, and lower probe into hole. Numerals in readout panels will indicate exact hole position to .001".

You can see why the FI-22 is up to ten times faster than conventional surface plate and height gage inspection. On top of that, you can use it for layout scribing and center-punching. Write for Bulletin FI-22X and ask your Sheffield representative where you can see a demonstration of this machine.

The
SHEFFIELD
Corporation

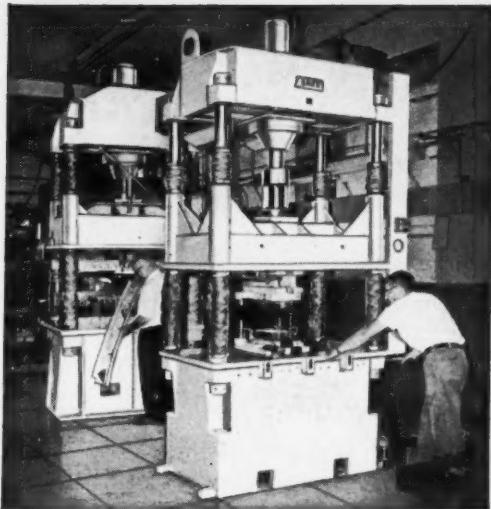
Dayton 1, Ohio

A subsidiary of The Bendix Corporation

Inspection Gages, Dimensional Control Instruments, Machine Controls, Automatic Gaging & Assembly Systems, Measuray® X-Ray Thickness Measuring, Crushtrue® & Multiform® Grinders, Cavitron® Ultrasonic Machine Tools, Press-Pacer® Transfer Units, Large Dies, Tooling, Contract Manufacturing.

For more data circle 380 on Postpaid Card

Two **DAKE** DIE TRYOUT PRESSES in Custom Die Shop?



Greenville Tool & Die Company, Greenville, Michigan, purchased a 150-ton Dake Hydraulic Die Tryout Press to relieve the workload on their mechanical facilities. After delivery, management discovered that the backlog of work for the Dake press was far greater than it was for the mechanical presses. Its smooth, accurate operation enabled it to easily handle press work that would otherwise be difficult or impossible. A second Dake Hydraulic Die Tryout Press was installed because no other press could do as much work so well.

The Dake Die Tryout Presses can be stopped and reversed at any point in the stroke—diemakers can see just when and why blanks are “dragging” or “tearing,” and their large daylight area allows the die to be “barbered” without removing it from the press.

At the Greenville Tool & Die Company, Dake presses are also used to align punches, “shear-in” irreg-

ularly shaped surfaces, develop blank sizes and shapes, find the right redraw depths, and even straighten heat-treated die parts.

Dake Die Tryout Presses are available in 9 standard models from 25-ton to 300-ton capacity, and in custom engineered models to 600-ton capacity to meet special requirements. Send for Bulletin No. 330 for specifications.

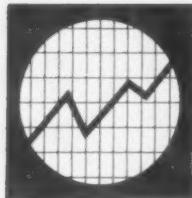
DAKE CORPORATION, 612 Robbins Road, Grand Haven, Michigan

**DAKE
PRESSES**



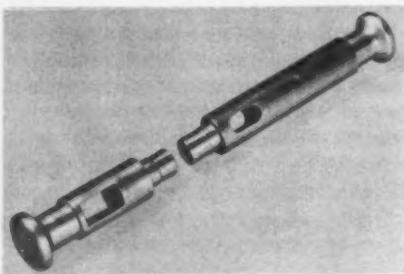
For more data circle 381 on Postpaid Card

MORE PRODUCTION



New Tungsten Steel Provides Longer Tool Life in Compacting Abrasive Ferrite Powders

I.B.M. Corporation, testing a new tungsten tool and die steel at its Poughkeepsie, N. Y., plant, has gotten up to 12 times the service life formerly obtainable from punch holders used in compacting extremely abrasive powdered iron oxide. The tools are subject to unusually difficult wear conditions in the manufacture of ferrite magnetic cores



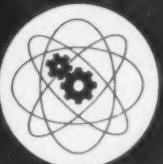
View shows upper and lower punch holders made from Carpenter Hi Wear 61 steel which minimizes wear occurring on the sides of the shafts and on the heads that ride on one cam and are drawn down by another cam.

for the memory apparatus in electronic computers. A four-month production run on one of the company's rotary presses, however, indicated that Carpenter Hi Wear 64 offered high resistance to wear in this application.

The machine on which the tools are used is a tabletting press that has been customized in many respects to automate production and obtain close tolerances. It has a micrometer adjustment to control the weight and the thickness of the tiny cores, a signaling device in case a punch hangs up, a selector dial and pocket for the product of each punch, a photoelectric cell control which reflects off the work table, and a power feed hopper. The press head itself is refinished to provide precise indexing between the lower and upper punches.

As the press head revolves, some of the abrasive powder flies into the machine and works its way between the shafts of the punch holders and the bearings. Even the slightest abrasive wear can be disastrous because the tolerance between the punch holder and bearing is plus/minus 0.0001 inch. The tolerance

THROUGH MODERNIZATION



between the carbide rod and tube forming the core, furthermore, is also plus/minus 0.0001 inch. Since the Carpenter steel is affected much less by the abrasion, the parts now last much longer.

The magnetic cores have a hole diameter of 0.030 inch, an o.d. of 0.050 inch, and a thickness of 0.012 inch. They weigh 1.3 milligrams, and are held within plus/minus 1/10 of a milligram to that weight. After pressing, they are sintered to withstand final usage.

Both the upper and lower punch holders used in the pressing operation are made from 1 $\frac{1}{8}$ -inch bar stock. The bottom surface of the lower punch holder or spindle is only slightly lubricated for easy movement on a circular track. A small amount of lubrication is used also on the head and upper shaft of the top spindle. In service, the steel spindles develop a slippery surface in much the same way that high tungsten steels usually behave. Ability of the tool to work with little or no lubrication is important because the powder used in forming the cores must remain perfectly dry.

Each tool is precisely turned,

milled, drilled, heat treated, cylindrically ground, and jig-ground before it is put into use. A diamond wheel is used to jig-grind the hole in the punch to within plus/minus 0.0001 inch concentricity with the



Selector dial and refinished press head used by I.B.M. in producing ferrite magnetic cores. Location of powder feed hopper indicates how close the abrasive powders are to moving parts which are susceptible to wear.

more production . . .

o.d. Because of the steel's extreme wear resistance, grinding is done slowly and carefully. Only 0.010 to 0.015 inch of surface is removed by grinding. A 120-grit silicon carbide wheel is used with 0.0005-inch maximum infeed.

For more data circle 1 on Postpaid Card

★ modern machine shop ★

Mechanical Hands Manipulate Radioactive Fuel Elements

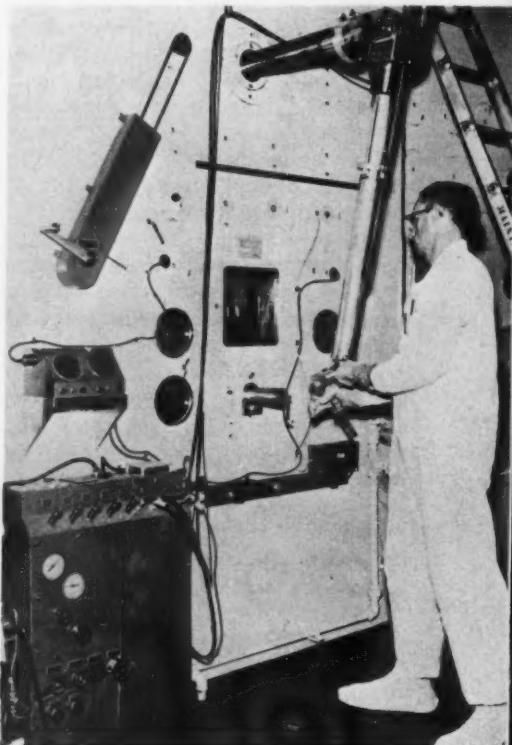
The wide experience of the Columbus Die, Tool and Machine Company, Columbus, Ohio, in building high precision special machines, machine components, tools, jigs and fixtures, recently proved valuable in building three manipulators for service at the General Electric Company's Hanford Atomic Products Operation, Richland, Washington.

Combination mechanically and hydraulically operated, these manipulators are now in successful service as mechanical hands used in performing remote control metallurgical tests on radioactive metals in Hanford's radiometallurgy laboratory. One of the four heavily shielded box-shaped multi-curie cells in this laboratory is specially equipped with three Columbus Die Tool-built manipulators, which are used for the handling and cut-off of radioactive fuel elements and reactor structural parts, such as process tubes.

During testing, nearly every operation has to be done by remote

control behind thick walls of concrete with windows of thick heavily leaded glass to protect technicians from radiation. The manipulators serve as an extension of the technician's hands. They must be capable of easily controlled, highly responsive, precision operation because of the dangers that are involved, and the high degree of accuracy which is required in the handling of radioactive materials of this type.

For more data circle 2 on Postpaid Card



Technician uses CDT manipulator for remote handling of fuel elements as he watches work through special viewing window in cell.



New— CARMET'S 700 Series Cutting Grades and the fine art of making chips

Some people baby their carbide tools. They hold back a little on roughing cuts, because they've heard carbide is pretty brittle . . . and some of it is. Or they ease off on finishing cuts, because their tool may be too soft for long, fast passes . . . because it may wear or crater. And, some of it will.

But this is "paring-knife" machining, and it really isn't necessary. Not any more . . . not since Carmet introduced the 700 Series Steelcutting Grades. No paring knife made these chips . . . these were hogged out on a production basis by one of Carmet's new carbides . . . Grade CA-720.

The job: rough facing railroad axle forgings in an automatic tracer lathe—210 sfpm—.076" feed—1½" width of cut. The result: over 1,000 cubic inches of steel removed in 5½ minutes, floor to floor, with plenty of red hot chips like these. And, 35 axles per tool against 25 pieces for the best competitive carbide tool . . . a tool carrying a higher price tag.

Carmet's 700 Series have the edge wear and crater resistance, and the ability to endure shock and heat, to breeze through jobs like this. They're doing just that all over the country . . . right now! Next time you're setting up a mean, tool-buster of a cut, let the 700 Series make chips and money for you, just once. Your Carmet Distributor has the local stock and all the information. Call him, or write:

**Carmet Division, Allegheny Ludlum Steel Corporation,
Ferndale, Detroit 20, Michigan. Dept. MS-8.**



CARMET® AL

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more production . . .

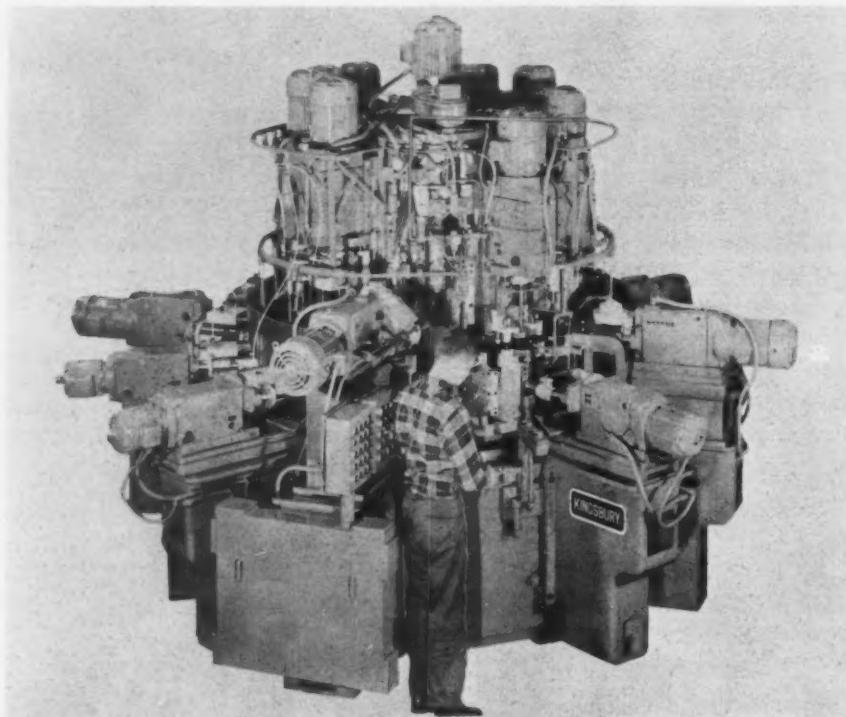
Machining Cast Iron Compressor Heads

The accompanying illustration shows a center column machine developed by Kingsbury Machine Tool Corporation, Keene, N. H., for machining cast iron heads used in compressors. The machine incorporates twenty-one units with 46 spindles for milling, drilling, reaming, counterboring, tapping and trepanning at a gross rate of 250 parts per hour. A 63-inch index

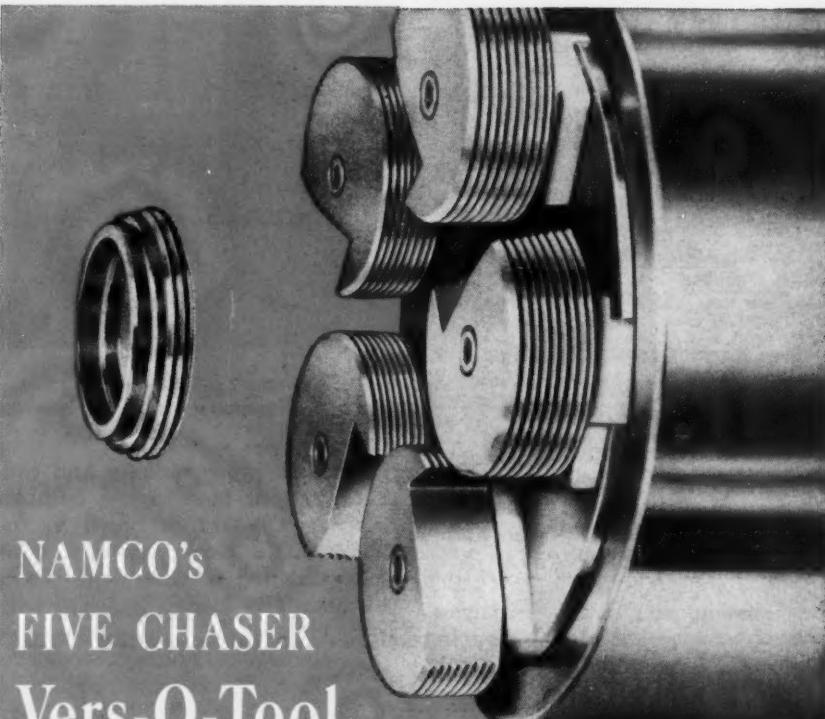
table holds 12 double-chucking work fixtures.

For the first chucking the work is located in the front of the fixture. A ram clamps it out against a fixed plate; a spring loaded ram works through a cam for the clamping, and an air cylinder automatically unclamps the work on its return to the loading station. Ten horizontal units with 17 spindles finish ten holes and mill a clearance cut.

For the second chucking the work is positioned on top of the fixture. It is clamped down only at each working station. The first horizontal unit (left of the operator's head in



Specially developed center column machine used for machining of cast iron compressor heads.



NAMCO's
FIVE CHASER
Vers-O-Tool...

Lear Romec's Solution To Tough Threading Tolerances

Charles Van Auken, Assistant Chief Production Engineer at Lear Romec Division of Lear, Inc., Elyria, Ohio tells us: "Threading specs for this lock-nut for a jet engine vane pump are tough . . . 1½-12N -3A, +.0000 and -.0045 on pitch diameter, 100 RMS on surface finish. Naturally, we use a NAMCO 5-Chaser Vers-O-Tool. It consistently surpasses the specs and sets up in a *fraction* of the time required for a 4-chaser tool. On threading jobs like this, the 5-Chaser Vers-O-Tool is our margin of profit!" Anyone who has ever used a NAMCO 5-Chaser Vers-O-Tool will agree. There just isn't anything that threads better. And, there are good reasons . . . all outlined in our new Bulletin DV-1."Five Circular Chaser Threading". At your request, we'll be happy to send you a copy.

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August, 1961



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MODERN MACHINE SHOP 119

more production . . .

the illustration) mills two pads. An auxiliary air-operated toggle holds the work down at this station. Ten vertical units on the center column finish 11 holes and trepan in two places. Bushing carriers are provided to hold the work down at these stations.

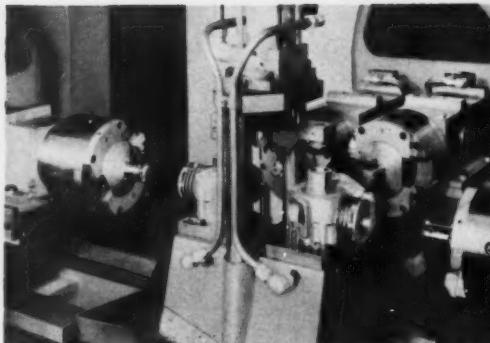
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★ modern machine shop ★

Three-Way Machine Efficient for 90-Degree Cylinder Machining

The 90-degree built-in accuracy of an Ex-Cell-O 3-Way Machine, manufactured by Ex-Cell-O Corporation of Detroit, Michigan, proved to be an ideal selection for boring and chamfering the steel sleeves and facing the die-cast aluminum cylinder castings of a well known automotive part supplier's 90-degree V-type compressor assembly. Since the compressor cylinders are at 90-degree angles and the individual units of the way machine are assembled at 90-degree angles, this arrangement permits machining both cylinders of two units simultaneously. Aluminum cylinder castings and SAE 1010 steel sleeves are both machined with the same spindles in one cycle of operation.

In operation, four boring spindles converge on the workpieces and take a 0.060-inch finish cut in the cylinder liners. At the end of the stroke, a 30-degree chamfer is cut. Tool slides of bridge-type facing



Ex-Cell-O 3-Way Boring Machine for boring, facing, and chamfering compressor cylinders.

heads then move radially and generate a joint face in the cylinder castings. Coolant is piped to the center of the workpieces and carefully directed to each bore. Parts are manually loaded and hydraulically clamped.

Regardless of heavy stock removal from the bore, a good finish is produced ready for honing. Tolerance is held within 0.001 inch. Gross production of 220 parts is attained using two machines and a single operator.

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More Information?

**For additional information
on any product mentioned
in this issue, please use the
READER SERVICE CARDS
opposite pages 32 and 228.**

HOW DO YOU LIKE THE BOSS' SINGER,
NUMERICAL CONTROL?

WONDER
WHAT THE
OLD LADY
DREAMED UP
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TIME?

THESE NEW SINGER UNITS
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SALAMI!
ALWAYS
SALAMI!

THE NOON WHISTLE

(one of a SINGER® series)

FIGURES TO SAVE A 100
BUCKS A WEEK ON SHORT
RUNS, SIMPLE TO OPERATE,
TOO!

A
STALE ROLL
YET!

YEP, THE BOSS SURE IS A
SMART OPERATOR.

A SMART
OPERATOR
I COULD
USE
AT HOME!

YOU, TOO, CAN SAVE WITH SINGER NUMERICAL CONTROL

These actual case histories show how 41½ hours of machine shop production by the usual method were reduced to 5½ hours with SINGER Numerical Control:

JOB

(1) Drill Jig for Terminal Board, Jig Bore all Holes

USUAL METHOD

8 Hours

SINGER NUMERICAL CONTROL

2 Hours

(2) Jig Bore 38 Holes in each of Three Chassis

3 Hours/10 Min.
x 3 Pieces

First Piece — 25 Min.
Second and
Third Pieces — 16 Min.
Total 41 Min.

(3) Nine Motor Housings

Total 9½ Hours

a. Layout 6 holes and drill on faces of housings

1 Hour/10 Min.
x 9 Pieces

First Piece — 23 Min.
Next 8 (total) — 48 Min.
Total 71 Min.

b. Layout 7 holes and drill on outside diameters of
housings

1 Hour/30 Min.
x 9 Pieces

First Piece — 26 Min.
Next 8 (total) — 72 Min.
Total 98 Min.

Grand Total: 41½ Hours

5½ Hours

MOST IMPORTANT, you'll find that SINGER Numerical Control will pay for itself in a very short period of time. For full details, write to the address below:



DIEHL MANUFACTURING COMPANY

SUBSIDIARY OF THE SINGER MANUFACTURING COMPANY

Pindernie Plant, Somerville, New Jersey

Telephone: Randolph 5-2290

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August, 1961

MODERN MACHINE SHOP 121

tion. A spacer block placed under the

IDEAS FROM READERS



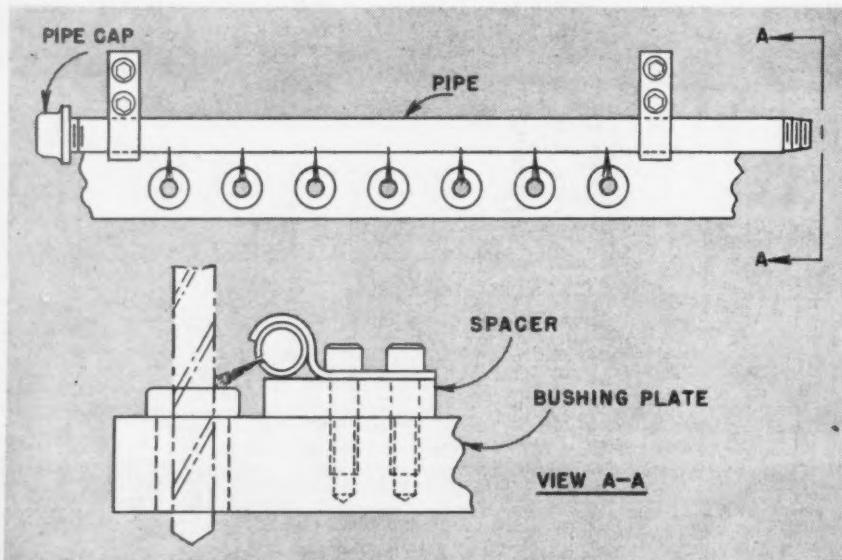
Concentrated Coolant Aids Drilling

By ROGER ISETTS

When drilling a series of holes at one time in long shafts, tubing, and so on, supplying enough coolant in the right place often becomes a problem. This is particularly true when machining high production

parts of tough material. Shown in the accompanying sketch is a simple, inexpensive method of providing a concentrated coolant spray that is conveniently fed from only one source. This setup is designed to prevent dulling and drill breakage caused by insufficient coolant, thus permitting higher speeds and feeds.

An orifice is drilled in a length of standard pipe at each bushing loca-



Setup for supplying coolant when simultaneously drilling series of holes in long workpieces.

tion. A spacer block placed under the pipe at each end serves to elevate it to the proper height. Two simple strap clamps secure the pipe to the top of the bushing plate with socket head cap screws. Standard taper threads are cut on both ends of the pipe. One end is capped and the other end is connected to the coolant supply.

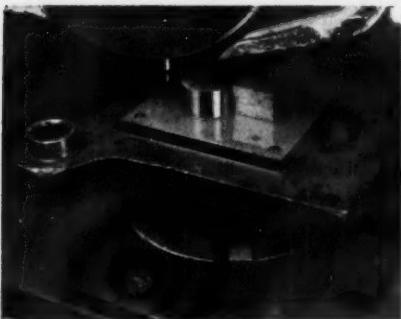
The entire assembly is an integral part of the jig and is stored with it, making it always at hand. This eliminates the time-wasting procedure of searching around for pipe, fittings, and other equipment each time the job is set up.

* modern machine shop *

Lathe Chuck Aids Die Grinding

By H. J. GERBER

Regrinding press dies without dismounting them from the die set can be easily accomplished by mounting a universal lathe chuck on a surface grinder, as shown in the accompanying illustration. The chuck is fastened to a flat plate which is seated



Simple method for regrinding a press die.

August, 1961



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PORTABLE HONES

SAVE MANY HOURS IN PRODUCTION,
SALVAGE, JOB LOT, MAINTENANCE
AND TOOL ROOM

More than 100,000 satisfied users testify to the utility of these "Tools of a Thousand Uses" for internal diameter work in nearly all materials.

Sunnen Portable Hones are guaranteed to produce geometrically round, straight bores—accurate within .0005"—with any desired cross-hatched, lubricant-retaining finish.

Corrects Errors	Fastest Stock Removal
Exact Size Control	Positive Adjustment
Controlled Finish	Portable, Yet Rugged
Operates In any Position	

Your Sunnen Field Engineer will be glad to help you solve your sizing problems at no obligation to you.

SN-75 Midget Hone	Range 1 1/4" to 2"
JN-95 Junior Hone	Range 2" to 2 1/2"
AN-112 Standard Hone	Range 2 1/2" to 7"
AN-812 Heavy Duty Hone	Range 4 1/4" to 20 1/2"

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MODERN MACHINE SHOP 123

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HAS OVER 1001
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ELDORADO'S constant inventory of popular size GUN DRILLS is keyed to the needs of the industry, designed to the most exacting specifications! Made to produce economically, straight, round, accurately located, finely finished holes... FASTER, in One Single Operation.

Our years of accumulated GUN DRILL making experience and knowledge, plus a complete research and engineering department are yours to take advantage of.

Get these important benefits with ELDORADO

- The world's largest manufacturer of GUN DRILLS—exclusively.
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- Drill most materials—aluminum, cast iron, brass, tool steel, stainless, etc.
- Drill any shaped part to any depth (sometimes interrupted holes or across existing holes).
- Drill shallow or deep holes to precision tolerances.

Since these extras cost you no more...
your best bet is an ELDORADO GUN DRILL.

ELDORADO specialized engineers, backed by research facilities are available to assist you on special "HOLE" problems. WRITE TODAY!



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ideas from readers . . .

on the magnetic chuck of the grinder. The chuck grips the shank of the die set so that the entire assembly can be held in alignment.

In most cases, for simple blanking punches and dies this method gives results which are entirely satisfactory and saves a great deal of time by eliminating tear-down and reassembly of the dies.

★ modern machine shop ★

Telescoping Gage Made from Worn Plug Gage

By ROBERT MICALS

A worn plug gage fitted with hardened steel tips makes a handy gage for checking sheet metal channel, as shown in the accompanying illustration. The tips can be made from drill rod cut to various lengths, hardened, and ground round on one end. One end of the gage is locked tight and the other end of the gage is preset to the required dimension.



Worn plug gage fitted with hardened steel tips is ideal for checking sheet metal channel.

with THE BRUSH SURFINDICATOR “meeting specs” is just part of the pay-off...

NEW battery operated MS-1000

Standard 110 Volt BL-110

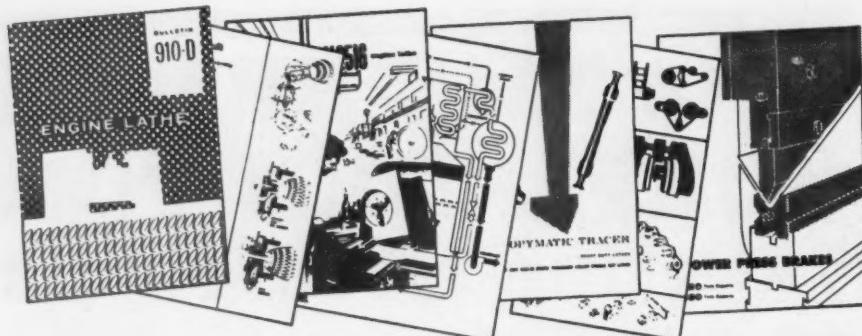


An Ohio missile-parts maker* knows why. His Surfindicator not only eliminates surface rejects but also cuts machine downtime 60%. Quick, accurate tool checks . . . at his machines . . . insure optimum tool changes to greatly extend productive tool life. Anyone, anywhere can measure any finish from 1 to 1000 microinches with a compact, portable Surfindicator. Choose the standard model or the ultimate in portability, the new battery powered, completely self-contained, 5½ lb. MS-1000. Ask your nearest Brush distributor for a demonstration. Write for our new booklet . . . 16 pages on how Surfindicator improves profits in five major operating areas . . . production, tooling, engineering, quality control and research.

*name on request

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Use Postpaid Cards opposite Page 32

Marking Machines

Acromark Company, 9 Morrell Street, Elizabeth, N. J. Bulletin No. 111, in color, describes many tooling setups on a machine designed to handle all types of roll marking applications on metal, plastics and other materials. Illustrations show many different tooling methods for circumferential marking, including serializing of cylindrical parts. For more data circle 5 on Postpaid Card

Twist Drills

American Twist Drill Co., 14301 West Chicago Blvd., Detroit 28, Mich. Catalog No. 960 fully describes high speed steel, solid carbide and carbide tipped drills, that have been added to the American line of drills.

For more data circle 6 on Postpaid Card

Grinding Machine

Antares Instruments, Inc., 55-02 37th Ave., Woodside 77, N. Y. Catalog, in color, illustrates and describes the universal tool grinding machine "FSM 2/M," which is designed for grinding of cutter heads, milling cutters, reamers, taps, turning tools, plain milling cutters with spiral cutting edges, side milling cutters, and hobs.

For more data circle 7 on Postpaid Card

Coolant Cleaning Equipment

Barnes Drill Co., 814 Chestnut St., Rockford, Ill. Bulletin No. 100-A illustrates and describes fabric filters and combination magnetic and fabric filters for honing, grinding, milling, drilling, super-finishing and other operations requiring clean coolant.

For more data circle 8 on Postpaid Card

Turret Lathe Tooling

Edward Andrews Tool & Machinery Co., 400-80 West 9 Mile Rd., Hazel Park, Mich. Catalog illustrates and describes a few of the turret lathe tools that are available. A price list is also included. For more data circle 9 on Postpaid Card

Electric Assembly Tools

Black & Webster, Inc., 570 Pleasant St., Watertown 72, Mass. 16-page catalog gives information on automatic or semi-automatic equipment used for staking, swaging, riveting, punching, marking and terminal setting.

For more data circle 10 on Postpaid Card

Polishing Rolls

Carborundum Co., Niagara Falls, N. Y. Folder on polishing rolls for lapping crankshafts and bearings tells the story of saving on abrasive costs while maintaining the micro inch finishes required for high speed bearing surfaces.

For more data circle 11 on Postpaid Card

Presses

Dake Corporation, 612 Robbins Rd., Grand Haven, Mich. 8-page booklet describes and illustrates Dake Horizontal Presses.

For more data circle 12 on Postpaid Card

Engine Lathes

R. K. LeBlond Machine Tool Co., Madison at Edwards Rd., Cincinnati 8, Ohio. Bulletin No. R-206 tells the story of the 21 and 24 inch Regal Engine Lathes. Descriptions and specifications of the Regal 21 and 24 inch plain and sliding bed gap lathes are also included.

For more data circle 13 on Postpaid Card

FREE LITERATURE

and Inside Back Cover for requesting free copies of literature listed below.

Tool Holders

Erickson Tool Co., 34358 Solon Rd., Solon, Ohio. Catalog L, Section B, in 2-colors, describes full-floating tool holders and flanged adjustable holders. **For more data circle 14 on Postpaid Card**

Press Control System

Di-Matic Controls, Inc., 100 Beadel St., Brooklyn 22, N. Y. Bulletin, in two-colors, describes and illustrates the Di-Matic System for preventing damage to dies on power presses, transfer machines and other automatic production equipment.

For more data circle 15 on Postpaid Card

Boring Machines

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. 2-color, 12-page booklet shows in condensed form Ex-Cell-O's complete line of standard precision boring machines, which are used for roughing and semifinishing work. **For more data circle 16 on Postpaid Card**

Lighting Equipment

Fostoria Corporation, Dept. 101, 1200 North Main St., Fostoria, Ohio. 4-page, 2-color brochure describes and illustrates some of Fostoria's Industrial Lighting Equipment, which is designed to meet illumination needs in critical work areas. **For more data circle 17 on Postpaid Card**

Thread Rolling and Forming Machine

Landis Machine Co., Waynesboro, Pa. Bulletin E-104 describes and illustrates Landis Hy-Duty Thread Rolling and Forming Machine. Specifications are also included.

For more data circle 18 on Postpaid Card

Adjustable Draw Plates

Fenn Mfg. Co., Fenn Rd., Newington, Conn. Catalog No. TH-62 contains detailed information on Turks Heads, adjustable draw plates that are used for forming accurate squares and rectangles directly from round wire and finishing special shapes or forming edge contours on flat metal ribbons.

For more data circle 19 on Postpaid Card

Roll Feeds

Ferguson Machine Co., 7818 Maplewood Ind. Ct., St. Louis 17, Mo. Catalog No. 500, in color, describes and illustrates cam indexed roll feeds.

For more data circle 20 on Postpaid Card

Die Casting Machine

Cleveland Automatic Machine Co., 4932 Beech St., Cincinnati 12, Ohio. Bulletin No. 461, in color, gives detailed specifications and illustrates construction features of the Cleveland Model 400 High Pressure Hydraulic Die Casting Machine.

For more data circle 21 on Postpaid Card

Arc Welder

Lincoln Electric Co., Cleveland 17, Ohio. Bulletin No. 4609-L describes performance features and construction details of the Idealarc R3M 3 phase rectifier type DC Arc Welder.

For more data circle 22 on Postpaid Card

Tables and Vises

Palmgren Steel Products, 8383 South Chicago Ave., Chicago 17, Ill. Catalog illustrates and describes different types of vises and rotary and indexing tables. **For more data circle 23 on Postpaid Card**

free literature . . .

Microhardness Tester

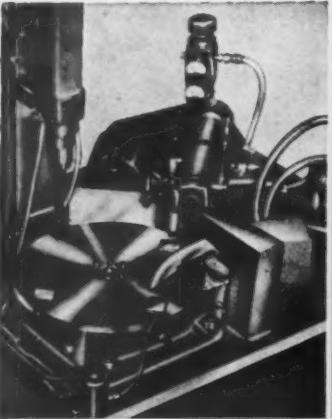
Newage Industries, Inc., 222 York Rd., Jenkintown 26, Pa. Two-color bulletin illustrates and describes hydrostatic microhardness tester.

For more data circle 24 on Postpaid Card

Cylindrical Grinders

Landis Tool Co., Waynesboro, Pa. Catalog CG-60 illustrates and describes precision cylindrical grinders.

For more data circle 25 on Postpaid Card



A

ALLEN AIR

INDEXING DIAL FEED TABLES

WITH POSITIVE LOCK
FEATURE



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AVAILABLE**

Write Before Next Tuesday!

ALLEN AIR CORP., 255 East 2nd St., Mineola, N. Y.

MMS-8

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Company.....

Address.....

City..... Zone..... State.....

For more data circle 388 on Postpaid Card

Flat Finishers

Hammond Machinery Builders, 1615 Douglas Ave., Kalamazoo, Mich. Catalog No. FF-755 describes and illustrates Hammond Abrasive Belt Flat Finishers for grinding, polishing and deburring flat work.

For more data circle 26 on Postpaid Card

Maintenance and Repair Parts

LaSalle Steel Co., 1420 150th St., Hammond, Ind. 16-page booklet presents helpful facts about making maintenance and repair parts. The booklet also offers ideas on how to save time in machining parts and to eliminate heat treating, quench cracks and last minute parts rejections.

For more data circle 27 on Postpaid Card

Index Center

Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn. Two-color brochure describes the Moore Index Center. Specifications and performance data are also included.

For more data circle 28 on Postpaid Card

Cutting-Off Wheels

Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7, Mich. Folder No. 222-16 describes and illustrates line of cutting-off wheels specially formulated for longer life and elimination of burn.

For more data circle 29 on Postpaid Card

Carbide Tools

Besly - Welles Corp., 120 Dearborn, South Beloit, Ill. 36-page catalog and price list features carbide tipped tools, blanks, inserts and holders.

For more data circle 30 on Postpaid Card

Lubrication Equipment

Lincoln Engineering Co., Industrial Sales Div., 4010 Goodfellow Blvd., St. Louis 20, Mo. 32-page catalog features Lincoln's complete line of lubricant application equipment with descriptions of fully automatic, semi-automatic and manual methods of operation.

For more data circle 31 on Postpaid Card

Endothermic Generator

Lindberg Engineering Co., 2450 West Hubbard St., Chicago 12, Ill. Bulletin T-200 describes the Hyen Endothermic Generator which provides an automatic process for producing protective atmosphere for bright hardening, bright annealing or bright brazing of steel, free of decarburization or carburization.

For more data circle 32 on Postpaid Card

Chucks and Vises
AMF Tool Div., American Machine & Foundry Co., 224 Glenwood Ave., Bloomfield, N. J. Two-color folder pictures and describes AMF Wahlstrom Drill Chucks and AMF Float-Lock Vises for both drill press and band saw applications.

For more data circle 33 on Postpaid Card

Test Report

Diamond Application Laboratory, Metallurgical Products Department, General Electric Company, 11177 East Eight Mile Road, Detroit 32, Michigan. A 16-page test report designated as C-112 covers man-made diamond wheels for tool and die steels. For more data circle 34 on Postpaid Card

Sheet Support for Power Squaring Shears

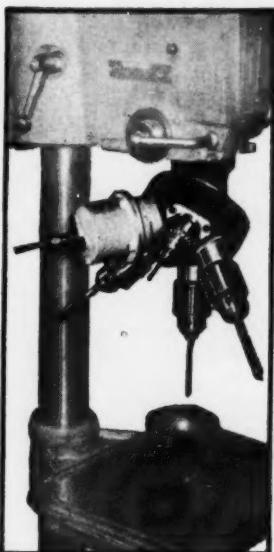
Niagara Machine & Tool Works, Buffalo 11, N. Y. Flyer illustrates and describes a magnetic sheet support that assures accurate gaging of wide, thin, flexible sheets on Niagara Power Squaring Shears.

For more data circle 35 on Postpaid Card

Hole Punching Units

Wales Strippit, Inc., 207 S. Buell Rd., Akron, N. Y. Catalog BN covers Wales Strippit BN self-contained tooling line. For more data circle 36 on Postpaid Card

TAKE THE OUCH OUT OF TURRET DRILL COSTS with



QUADRILL 4 & 5 SPINDLE TURRET DRILLING HEADS

CONVERT YOUR STANDARD DRILL PRESSES INTO PRECISION TURRET DRILLING MACHINES—one quadrill mounted on your drill press will ...

- Save you up to 70% in direct labor costs over in-line, single gang drill setups.
- Save you up to 350% in capital investment costs (other turret machines cost several hundred to thousands of dollars more).
- Do the work of 4 or 5 single drill presses—all work done at single hole location (increase production 50%, cut rejects, save floor space). Ideal for both long and short runs ... fast setups ... simple tooling.

DRILL, REAM, TAP,
COUNTERSINK AND
COUNTERBORE ON A
COMMON TOOL AXIS.

WRITE TODAY FOR BROCHURE

CHICAGO QUADRILL
Company

1854 BUSSE HIGHWAY DES PLAINES, ILLINOIS
For more data circle 309 on Postpaid Card

free literature . . .

Sprayed Metal Powders

Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich. Technical Data Sheet No. T-3 discusses the selection of metal powders for sprayed overlays. Both standard metallizing procedure and the Sprayweld Process are discussed. Characteristics of each method and the materials that can be applied are also listed.

For more data circle 37 on Postpaid Card

Pressure Blasting With Abrasives

Norton Company, Worcester 6, Mass. A report on pressure blasting with manufactured abrasives describes the areas of application for pressure blasting and the various media used. Charts and drawings provide useful operating information and procedures for the popular types of media and equipment.

For more data circle 38 on Postpaid Card

Brazed Tools and Carbide Blanks

Valenite Metals Div., Valeron Corp., Box 205, Royal Oak, Mich. Catalog No. GC-61A, in color, gives information on Valenite's standard blanks, brazed tools and preformed carbide.

For more data circle 39 on Postpaid Card

Unitized Tooling

Tool Products Corporation, 377 Old Falls Blvd., North Tonawanda, N. Y. Catalog describes Tool Products' full line of Unitized Tooling for the metal-fabricating industry. Prices and technical information are also included.

For more data circle 40 on Postpaid Card

Gears and Splines

Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich. Selector data sheet illustrates typical gears and splines, and shows the best processing method for each, depending on high, medium or low production requirements. 26 basic types of gear cutting, grinding and finishing machines, gear checking equipment and gear cutters are also pictured.

For more data circle 41 on Postpaid Card



No—some holders just "wobble." But Scully-Jones floating holders provide unrestricted float for improved drilling, reaming, and tapping. A constant velocity, flexible drive coupling eliminates "dead" spots and binding. Three styles (left to right): "JS" for turret lathes and automatics; "JA" for standard radial drills and drill presses; lock-and-eject type "JT" for multiple-spindle machines. For complete description and specifications ask for Bulletin No. 8-50.

**SCULLY
JONES**

Scully-Jones and Company

1909 South Rockwell Street, Chicago 8, Illinois

For more data circle 390 on Postpaid Card

Thread Grinding Machine

Jones & Lamson Machine Co., 521 Clinton St., Springfield, Vt. Six-page folder describes Model 410 Semi-Automatic Thread Grinder.

For more data circle 42 on Postpaid Card

Tailored Tooling

Kennametal, Inc., Latrobe, Pa. 8-page bulletin shows how to use a new line of Kenedex Standardized Adjustable Units with "throw-away" inserts in multiple-insert and special tools designed for specific jobs.

Features, mounting methods and complete specifications of the units are given.

For more data circle 43 on Postpaid Card

Valve

Vickers, Inc., Div. of Sperry Rand Corp., Detroit 32, Mich. Bulletin 61-79 describes a single stage servo valve, Series SC4, for application in electro-hydraulic servo systems.

For more data circle 44 on Postpaid Card

Surface Grinder

Boyar-Schultz Corporation, 2020 S. 25th Ave., Broadview, Ill. Brochure, in color describes and illustrates the Model 6-12 Surface Grinder. Specifications are also listed.

For more data circle 45 on Postpaid Card

Cylinders

Mo-Bar Hydraulics Co., Crystal Lake, Ill. Bulletin No. 203, in color, describes and illustrates hydraulic and air cylinders. Mounting styles and accessories are also included.

For more data circle 46 on Postpaid Card

Carbide Tools

Vascoloy-Ramet Corp., 886 Market St., Waukegan, Ill. Price list No. 5, for use with Catalog VR-58, provides reduced prices on some carbide items. The 48-pages list V-R's complete line of carbide blanks and tools, carbide and ceramic inserts, Tantung cast-alloy tools, toolholders and face mill cutters. Detailed charts give product dimensions, part numbers, grades stocked, standard package quantities, base prices and maximum catalog quantities.

For more data circle 47 on Postpaid Card

DUSTKOP "520"
Designed to collect dust from
single machines

portable —
easily installed

DUSTKOP
STOPS DUST

Self-contained Dust-kop models like the '520' are practical and effective in collecting dust from single machines. They're designed specifically for service with surface grinders, tool and cutter grinders, offhand grinders, buffers and other small wheel equipment.

grinders, buffers and other small wheel equipment. These units are also easy to install — are actually portable — and very economical to operate.

With our illustrated manual you can do it in 45 minutes — it's that simple!

NEW DUSTKOP AUTO-SHAKEN
shake filters AUTOMATICALLY

AGET manufacturing company ask for details
1398 E. Church Street, Adrian, Michigan
For more data circle 391 on Postpaid Card

free literature . . .

Universal Grinders

Alina Corporation, 122 East Second St., Mineola, L. I., N. Y. 20-page catalog, in color, illustrates and describes the Tschudin Universal Grinders.

For more data circle 48 on Postpaid Card

Micrometer

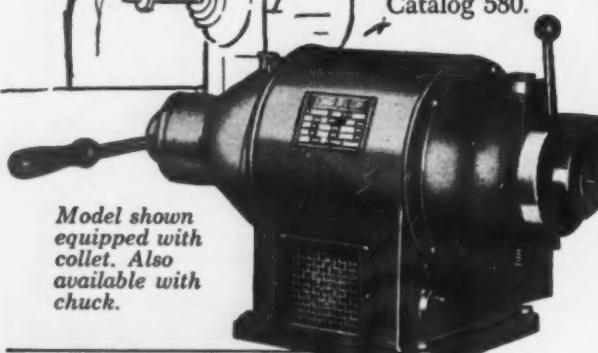
J. T. Slocumb Co., 68 Matson Hill Road, South Glastonbury, Conn. Folder, in color, illustrates the Speedmike, an improved direct reading micrometer.

For more data circle 49 on Postpaid Card



—and many other secondary finishing jobs on metal and plastic parts—is handled faster, cheaper and better with
SCHAUER SPEED LATHES.

Write for Catalog 580.



Model shown equipped with collet. Also available with chuck.

SCHAUER
MANUFACTURING CORP.

4501 ALPINE AVE.
CINCINNATI 42, O.

For more data circle 392 on Postpaid Card

Case for Guide and Piston Rods

Thomson Industries, Inc., 1029 Plandome Road, Manhasset, N. Y. 2-page, 2-color bulletin describes a bronze case for guide rods and piston rods. Saving advantages, specifications and sizes of the various products are also listed in the bulletin.

For more data circle 50 on Postpaid Card

Hand Tapping Machine

Producto Machine Co., Toolroom Equipment Div., 990 Housatonic Ave., Bridgeport 1, Conn. Two-page illustrated data sheet describes Model VT-1 Universal Hand Tapping Machine designed for adaptability and complete freedom of action.

For more data circle 51 on Postpaid Card

Conveyor Belting

May-Fran Mfg. Co., 1710 Clarkstone Rd., Cleveland 12, Ohio. Bulletin MF-300 provides illustrative dimensional information for the application of May-Fran Flat-Top Steel Belt Conveyors.

For more data circle 52 on Postpaid Card

Shipping Bags

Jiffy Mfg. Co., 360 Florence Ave., Hillside, N. J. Three case history reports, showing how the use of Jiffy Shipping Bags solve packaging problems, have been completed.

For more data circle 53 on Postpaid Card

Diamond Tools

Victory Diamond Tool Co., Inc., Dept. S. P. O. Box 348, East Orange, N. J. 4-page catalog explains the importance of good quality diamond tools.

For more data circle 54 on Postpaid Card

He's making a Monarch Lathe...



Final spindle runout test. Today's typical limit: .0003" on test bar inserted in spindle, 14" out from nose. Tomorrow's limit? The ultimate that the user's requirements might justify.

One example of where the extra values come from—in your MONARCH Lathes

Over and over, as a Monarch Lathe evolves, this scene repeats itself with constant variations. Although we ignore no areas in enforcing accuracy standards, we are almost obsessed in our attention to the most sensitive of all—the headstock spindle. True lathe accuracy is out of the question without utmost accuracy here.

In the picture above you see one of the 27 final Spindle-ception tests. And don't forget that this, and every Monarch spindle, has already been checked and rechecked at every step of its production.

Such accuracy is not only a fetish with us, but a special benefit to you. It delivers such finish as to cut considerably—or eliminate—other operations. It lengthens tool life. It contributes to increased production at greater speeds and feeds.

When you invest what it takes for a good lathe today, isn't anything less than the greatest value a false economy? We can prove it on your part, using our machines, in our Turning Clinic here in Sidney. Just write—THE MONARCH MACHINE TOOL COMPANY, SIDNEY, OHIO.



WHEN YOU BUY VALUE
MONARCHS COST LESS

Monarch
TURNING MACHINES
THE MONARCH
MACHINE TOOL
COMPANY
SIDNEY, OHIO

VISIT MONARCH—We'll turn your part to return you profit

For more data circle 393 on Postpaid Card

NEW FINISHING MACHINE FOR HIGH PRODUCTION

- DEBURRING
- EDGE BLENDING
- SURFACE CLEANING
- POLISHING
- BUFFING



5224-M1A Osborn
Finishing Machine
—increases
production...
improves quality...
reduces cost.

For job shop or continuous production runs—this compact, semi-automatic unit is ideal for an extremely wide range of metal finishing operations. Simple design, easy setup, inexpensive fixturing make this two-spindle machine a highly *versatile* tool. Finishing head is self-contained . . . workholder operates at up to 1800 indexes per hour. *The Osborn Manufacturing Company, Dept. B-35, Cleveland 14, Ohio. Phone ENDicott 1-1900.*

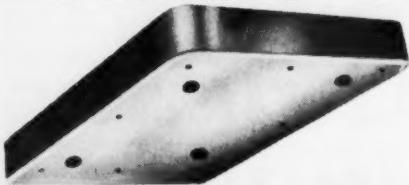
WRITE FOR NEW BULLETIN 630. Includes detailed performance, operating and application specifications on new Osborn 5224-M1A metal finishing machine.



Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes
Foundry Production Machinery



For more data circle 394 on Postpaid Card



"FLYING CARPET"

"FLOATING AIR PLATFORM"
FOR JIGS AND FIXTURES

FLOATS THE WORK ON A FRICTIONLESS FILM OF AIR

Put one or more, depending on size, under a Jig or Fixture, and the loaded unit, weighing 25 to 1000 pounds, can be moved with a finger. Your machine operator won't be so tired so will AUTOMATICALLY work faster when loading a Jig or moving it from spindle to spindle. MORE PIECES ARE DONE PER HOUR. LESS WORK SPOILAGE, TOOLS line up with the bushings better, they don't chip, STAY SHARP LONGER. Comes ready to go to work, with valve, hose and fittings.

TRY ONE ON A 10-DAY, MONEY BACK GUARANTEE

PRICES: Model "A" 6" x 5 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ " \$42
Model "B" 10" x 5 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ " \$50

The "Mighty Midget" Line

Makers of the "MIGHTY MIDGET"
RADIUS & ANGLE DRESSERS.

SPERMAN METAL SPECIALTIES • 2199A E. 21st ST. • BROOKLYN 29, N.Y.

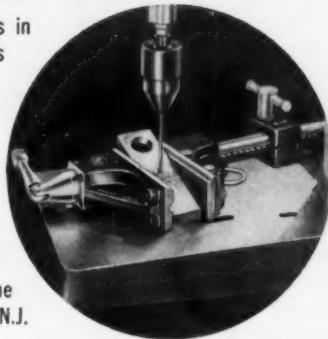
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Instant change cuts production costs

AUTOMATIC KEYLESS CHUCK permits tool changes in seconds without stopping the spindle; prevents chewed-up shanks. One spindle does the work of many. The greater the torque, the tighter the grip.

DRILL PRESS VISE floats, and locks instantly, positively, in any position on the table. Holds work safely for accurate drilling and tapping. Three models: 8", 9" and 12" capacities.

Write for illustrated folder and name of nearest distributor to AMF Tool Division, American Machine & Foundry Company, 224 Glenwood Ave., Bloomfield, N.J.

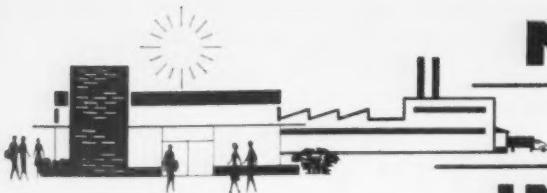


WAHLSTROM®
AUTOMATIC CHUCKS



FLOAT-LOCK®
SAFETY VISSES

For more data circle 396 on Postpaid Card



NEWS OF THE INDUSTRY

SCULLY-JONES FORMS NEW ORGANIZATION

In a major expansion of its export sales and service, Scully-Jones and Company, Chicago manufacturer of standard and special production tools, has formed a new organization, Scully-Jones International, S.A. The central office is located in San Juan, Puerto Rico. L. H. Skoglund, Jr., has been appointed president, and Lloyd J. Houghlett has been appointed manager of Scully-Jones International, S.A.

Scully-Jones International has licensed the following companies to manufacture and/or sell Scully-Jones tools in their respective countries: Kuroda Gauge Manufacturing Co., Ltd., Tokyo, Japan; The Sutton Tool & Gauge Mfg. Co. Pty., Ltd., Melbourne, Australia; and B. O. Morris, Ltd., Coventry, England. The latter firm also will sell and service Scully-Jones products to other countries of the European Free Trade Association: Portugal, Norway, Sweden, Denmark, Austria, and Switzerland.

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MADISON INDUSTRIES LICENSES ENGLISH FIRM

Madison Industries, Inc., Providence, Rhode Island, originator and manufacturer of Madison Tools, has announced the licensing of Birmingham Tool & Gauge Co., Ltd., Birmingham, England to manufacture and sell the full line of Madison Tools and accessories in England. This contract

brings together two companies with many years of experience in designing and manufacturing cutting tools for the metalworking industry. Madison's two-lip boring and reaming tools have been an industry standard for many years, and its new program of diversification includes spade drills, recessing tools, boring tools with throwaway inserts, and roller burnishing tools. Birmingham Tool & Gauge has a reputation of long standing in the British Isles and on the Continent for reliable tooling and gauging. ★

MORTON ELECTS VICE PRESIDENT OF ENGINEERING

Sherwood J. Basch has been elected vice president of engineering of the Morton Manufacturing Co., Muskegon Heights, Mich. Mr. Basch has been with the company in various engineering capacities since 1940.

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MOORE SPECIAL TOOL CREATES EXPORT DIVISION

Because of the continuing expansion of its overseas sales for jig borers, jig grinders, and measuring machines, Moore Special Tool Company, Bridgeport, Conn., has established an Export Division in the Empire State Building, New York City N. Y. Joseph T. Rizzo has been named Export Manager.

The Export Division will make periodic visits to the Moore international dealer network to train service personnel, discuss customer

requirements for toolroom equipment and procedures, and demonstrate the advantages in quality, design, and precision of Moore machines.

★ modern machine shop ★

**LeBLOND EXECUTIVE COMPLETES
50 YEARS SERVICE**

B. N. Brockman, vice president and sales manager of the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, upon completion of his "first 50 years" with the Company recently was presented was a scroll signed by LeBlond personnel, and a book containing many congratulatory letters and telegrams to mark the occasion.

He finds being dean of machine tool salesmen no reason to shift the burden to other shoulders. Before World War II, he headed up LeBlond's Chicago sales office; he has been directing sales activities from Cincinnati ever since. Mr.



B. N. Brockman

Brockman attended Ohio Mechanics Institute and the University of Cincinnati, starting at the bottom of the ladder in the LeBlond shop in 1911.

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**ILLINOIS TOOL ACQUIRES
OWNERSHIP INTEREST
IN AUSTRALIAN FIRM**

Illinois Tool Works, Chicago, Ill., has acquired an ownership interest in

GOOD ON YOUR LATHES...

**VERY GOOD
FOR YOUR
TURNING
COSTS**



Multi-Duty models for light work and general use. Rigid, accurate. Interchangeable male, female and pipe points.

ACCURATE

IDEAL LIVE CENTERS

4 complete lines. Over 40 sizes and styles.
All popular tapers for heaviest to lightest work.

If you turn metal, it's just good operating sense to save money with Ideal Live Centers. You'll get accuracy to meet your stated standards, at your turning level and at lowest center point costs. You'll reduce your inventory costs with fast delivery from Ideal distributor stocks. State your requirements, as tight as you like. He'll meet them exactly with the Multi-Duty, Universal, Heavy-Duty or Pipe Point model right for your job. For custom quality at production prices, call on him for all your live center needs.

For more data circle 397 on Postpaid Card

Sold through
Leading
Industrial
Distributors
In Canada:
IRVING SMITH, Ltd.,
Montreal

**IDEAL
INDUSTRIES, Inc.**
1031-H Park Avenue
Sycamore, Illinois

news of the industry . . .

W. A. Deutsher Pty. Ltd., in Victoria (near Melbourne) Australia. Deutsher, established in 1921, is a major Australian producer of screw machine parts, such as valve fittings and industrial fasteners. Relationship between the two firms began several years ago when Deutsher was granted a license for the manufacture and distribution of certain of ITW's fastening products.

Deutsher will produce an expanded line of Shakeproof and Fastex fasteners for the automotive, appliance, and electrical industries in Australia.

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NATIONAL STEEL TO INSTALL LIGHTWEIGHT TIN PLATE PRODUCING FACILITIES

The first facilities especially designed and constructed for production of lightweight tin plate will be installed by National Steel Corporation at the Weirton, West Virginia, plant of the Weirton Steel Division. The new facilities will consist of a two-stand tandem cold mill and a cleaning, chemical treatment and oiling line. The tandem cold mill will be equipped with a total of approximately 7,000 horsepower and will be constructed for an operating speed of 3,000 feet per minute.

The two new buildings at Weirton Steel will have a combined floor area of approximately 45,000 square feet and will be constructed as an extension of the tin mill. Tin plate will be conveyed

TORIT



Torit Cyclone Separator Model. High efficiency collection of all types of dust, chips and shavings. Up to 95% of the dust is removed from the air, drawn into the top of cone by centrifugal force, and settled to the dust reservoir below. Clean air is exhausted outside the building or indoors through after filters.

Self contained, compact, portable steel units. End mounted motor and blower mounted in free air for cool operation, is detachable for servicing or relocation of outlet. Cones can be rotated for proper inlet location. Dust reservoir has pull-out drawer for easy cleaning. Individual capacities range up to 6500 cubic feet per minute. Larger units are built on special order.

Prices start at \$335.

DUST COLLECTORS STOP LOSSES CAUSED BY DUST

- *machine wear*
- *absenteeism*
- *product damage*

With a Torit Dust Collector, machines stay clean, hold close tolerance up to 80% longer. Dust is kept off bedways, slides, and bearing surfaces. There are fewer accidents because work areas are clean and safe. Employees work more efficiently in clean air, their health protected. And there is no dust in the air to harm fine product finishes.

* For a FREE handbook detailing specifications and performance data of Torit Dust Collectors and applications, write Dept. 730

TORIT
MANUFACTURING CO.
1133 Rankin St. • St. Paul 16, Minn.
398 on Postpaid Card

For more data circle

directly from the four electrolytic plating lines to the new "Weirlite" plant. The material will flow in one direction through the tandem cold mill and in the opposite direction through the cleaning, chemical treating and oiling line to the present coil storage floor. Coils are moved from this area to adjacent facilities to be bundled for shipment as coils or to be cut for shipment in sheet sizes.

★ modern machine shop ★

BURGMMASTER APPOINTS VICE PRESIDENT OF MANUFACTURING

Mr. John A. Manders, formerly in charge of tooling, inspection and methods, has been appointed vice president in charge of manufacturing, for Burgmaster Corporation, 15001 South Figueroa St., Gardena, Calif.

Mr. Manders, who received his education at the University of Minnesota, has been with Burgmaster since 1954 when he joined the firm as a master mechanic in charge of the machine shop. Mr. Manders will be in charge of all manufacturing operations at the company's newly expanded facilities.

★ modern machine shop ★

LINCOLN FOUNDATION APPOINTS SECRETARY

Dr. E. E. Dreese, Chairman of the Board of Trustees of the James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, has announced the appointment of Charles G. Herbruck as secretary of the Foundation. Mr. Herbruck has been assistant secretary since 1947 and has been acting secretary since the death of A. F. Davis,

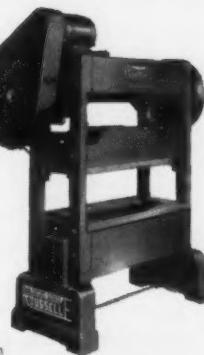
High-Output with Rousselle

DOUBLE-CRANK PRESSES



No. 4B OBI with "Econo-Air" clutch.

SPEED UP PRODUCTION with these versatile 40-ton presses. Large bed and ram areas make them ideally suited to handle wide rolls or sheets . . . do multiple punching, steel-rule die work and other high output operations. For rapid, shockless starting and stopping, presses can be equipped with electrically controlled "Econo-Air" friction clutch . . . Ask for new catalog.



STRAIGHT SIDE — Die space up to 24 in.; bed space up to 6 ft. between uprights.



Choice of over 30 models and types in 5 to 60-ton sizes

SERVICE MACHINE COMPANY

Mfrs. of Rousselle Presses

2310 WEST 78TH STREET • CHICAGO 20, ILLINOIS

For more data circle 399 on Postpaid Card

Rousselle Presses are sold exclusively through Leading Machinery Dealers.

news of the industry . . .

the organization's founding secretary. Mr. Herbruck is a graduate of Princeton University and has been active in the welding industry and the American Welding Society since 1942.

The James F. Lincoln Arc Welding Foundation was established in 1936 by the Lincoln Electric Company for advancing knowledge of the art and science of arc welding through study and education. The activities of the

Foundation will be carried on essentially as they have been, but will be expanded and intensified in some areas in order to accelerate progress in design of weldments and structures.

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HYDRAULIC PRESS MFG. CO. CHANGES NAME

The Hydraulic Press Manufacturing Company, acquired by Koehring Co., in 1956, has changed its name to H-P-M Division, Koehring Co. Previously, this Mt. Gilead, Ohio, manufacturer of plastic molding, die casting, and metal working machines, was known as the Hydraulic Press Manufacturing Co., a Division of Koehring Company.

There will be no change in sales, administrative, or manufacturing functions. These will continue to be located in Mt. Gilead plant.

★ m m s ★

NEW CORPORATION FORMED

A new company, The Simplex Tool Corp. of Butler, Wis., has been formed by the principals of the Northwest Tool and Engineering Co. and

WAIT!
Save Money!
DO THAT JOB
FASTER AND BETTER
WITH A **Severance**
MIDGET MILL!

Ask for a SEVERANCE catalog today! You'll find it detailed, well illustrated, suggestive and informative. It includes low regrinding rates.

YES, A SEVERANCE MIDGET MILL MAY WELL SOLVE YOUR PROBLEM AND SAVE YOU MONEY. IF YOU MUST REMOVE GATES, FINS, AND RISERS; BREAK SHARP CORNERS AND EDGES; MACHINE CARBON; FINISH CASTINGS OF ANY MATERIAL; WORK FILLETS, RADII, AND GROOVES; DEBURR OIL HOLES; BLEND WELDED AND ASSEMBLED PARTS; REMOVE FLASH; SMOOTH WELD BEADS; OR ANY OTHER SIMILAR OPERATIONS

MANY STANDARD SHAPES & SIZES TO CHOOSE FROM

SEVERANCE MIDGET MILL SET NO. 77

SEVERANCE MIDGET MILL SET NO. 77 IS A POPULAR SET OF 1/2" DIAMETER, 1/4" SHANK, HIGH SPEED MIDGET MILLS. MAKES A FINE GET-ACQUAINTED-SET AND WILL COVER A BIG MAJORITY OF YOUR NEEDS FOR THIS TYPE TOOL. LEAFLET NO. 651 GIVES DETAILED INFORMATION AND PRICES.

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Severance TOOL INDUSTRIES INC.
724 Iowa St. • Saginaw, Michigan



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the Wisconsin Drill Head Co., also located in Butler. S. Pohlhammer, President and J. E. Schultz, Secretary-Treasurer, and their associates, have purchased the inventory, equipment, trade name and other assets of the Simplex Machine Tool Corp. The new company will manufacture, sell and service the complete line of Simplex Boring Machines that have been produced and marketed to industry for the past thirty years. Mr. P. O. Wernicke, Chief Engineer and Sales Manager of the Simplex Tool Corp. will fill these positions in the new corporation.

* mms *

REED ROLLED THREAD TO EXPAND

A 10,000 square foot addition will be erected at the Reed Rolled Thread Die Co. in Holden, Massachusetts as soon as suitable contracts can be arranged. The additional floor space will permit the re-arrangement of machinery to effect a more efficient work floor, and to provide more stock room, shipping room, and storage space.

A central oil coolant and filtering system will be installed, as will an air purification unit. This will permit re-

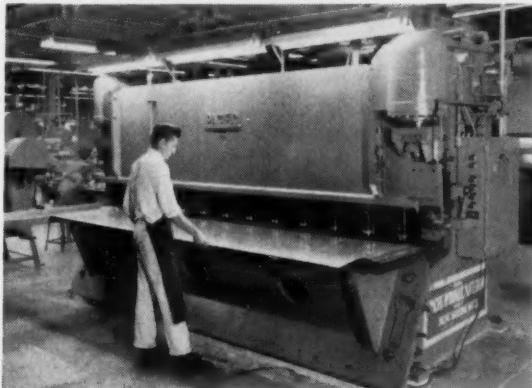
placement of some obsolete equipment and addition of new. Total cost of the building and new equipment is estimated to be approximately \$400,000.

* modern machine shop *

ELOX ACQUIRES FIRTH-STERLING METHOD X DIVISION

Sale of the Method X Division of Firth-Sterling, Inc., Pittsburgh, Pennsylvania, to Elox Corporation, Troy,

PACIFIC HYDRAULIC...THE VERSATILE SHEAR that cuts heavy plate or tissue-thin metal within thousandths of inch



Pacific Hydraulic is a general purpose shear handling a complete range of metal thicknesses within capacity. With both knife clearance and rake angle quickly and easily adjustable, shear can be used alternately for heavy duty plate work or fast, accurate shearing of thin sheet. At Alameda Naval Air Station, $\frac{3}{8}$ " Pacific Shear (above) is quickly set to .001" knife clearance for .005" sheet and reset rapidly and easily for cutting plate up to $\frac{3}{8}$ " thick. In any plant, large or small, a single Pacific Hydraulic will shear a complete range of metal thicknesses at substantial savings in capital investment and operating costs.

Write for brochure.

PACIFIC PRESSES & SHEARS

848 - 49TH AVE., OAKLAND, CALIF.: also MT. CARMEL, ILL.

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news of the industry . . .

Michigan, was announced recently. Elox has acquired certain patent rights, licenses and trade-marks, as well as all physical assets of the Method X Division, with the right to acquire all other Method X rights at a future date, if desired.

Both companies have designed Electrical Discharge Machining (EDM)

units. Elox has concentrated on the manufacture and sale of equipment in the U. S. On the other hand, Method X has emphasized the development of foreign markets and has directed its activities to developing electrical circuits and licensing machine builders. The announced acquisition by Elox is expected to result in rapid acceleration of American research and important technological advances.

★ modern machine shop ★

**CYLINDER MANUFACTURER
WINS AWARD**

The Miller Fluid Power Division, manufacturer of power cylinders, has been awarded, through its parent company, the Flick-Reedy Corporation, Bensenville, Ill., the nation's highest award in the industrial category. At the National Industrial Relation Association's Twentieth Anniversary Conference and Exhibit in Chicago, Ill., Flick-Reedy Corp., its Miller Fluid Power and Tru-Seal Divisions, was named winner of the 1961 Class AA Helms Industrial Recreation Award for operating the most outstanding employee recreation program among North American companies with less than 500 employees. The Award is one of five given annually by NIRA in conjunction with Helms Athletic Foundation to most outstanding U.S. and Canadian firms in various company-size classifications.

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POWER FEED**

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PF 100



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31 LBS.

\$197⁵⁰

0-10" PER MIN.
← INFINITE ADJUSTMENT
AT YOUR FINGER TIP
ZERO MAX DRIVE

ALSO RAPID TRAVERSE UNIT \$87⁵⁰
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35 LBS. WITH COLLET RACK



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CAM GRINDING**

To Your Specifications

CAM SERVICES CO.

DIVISION OF HIMOFF MACHINE CO.



LONG ISLAND CITY, N. Y.

23-16 44th ROAD

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NEW MARKETING CONCEPT ON POLISHED DRILL ROD

Firth Sterling Inc., Pittsburgh 30, Pa., has introduced a new marketing approach on polished drill rod—pre-packaged and priced by the piece. Drill rod will be available in four grades, pre-packaged in convenient jaw-opening boxes and handy cylinders, that will not only facilitate stocking and handling but will also

effectively protect the material from dirt and rust.

Because drill rod has been requisitioned and used by the piece, Firth Sterling now makes it possible for the user and distributor to price by the piece. The former price per pound method has been converted to price per piece and discount schedules are based upon total order value, by grade—to facilitate pricing by both the user and distributor of polished drill rod.

The Answer... TO INDUSTRY'S DEMAND FOR QUALITY, EFFICIENCY AND LOW COST ECONOMY

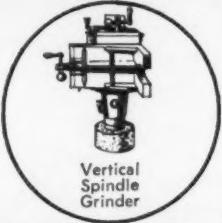
UNITED STATES ELECTRICAL GRINDERS-BUFFERS



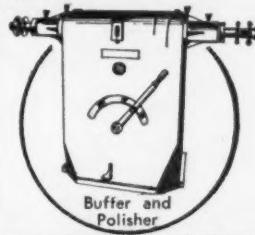
An investment in better, faster, production through the use of tools expertly designed and conscientiously crafted for your particular purpose.



General Purpose
Grinder



Vertical
Spindle
Grinder



Buffer and
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Precision Lathe
Grinder



Tool Post
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Grinder and
Buffer

"OVER 60 YEARS SERVICE TO INDUSTRY"

WRITE FOR CATALOGS

The United States Electrical Tool Co.
3640 LLEWELLYN ST., CINCINNATI 23, OHIO

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news of the industry . . .

COVEL ACQUIRES LATHE LINE FROM WADE

The Covell Manufacturing Co., Benton Harbor, Michigan, announced that it has acquired from the Wade Tool Co. of Waltham, Mass., its line of precision lathes consisting of hand

turret lathes, finishing lathes, and toolmakers lathes. Manufacturing, sales, and service will be moved to Benton Harbor.

The Wade Lathe line manufactured since 1872 will be added to the Covell line of precision grinders produced since 1874.

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FELLOWS GEAR SHAPER ELECTS TREASURER

E. W. Miller, president of The Fellows Gear Shaper Co., Springfield, Vt., has announced the election of William E. Millikin as treasurer and a member of the board of directors. He succeeds Frederick P. Dashner who has recently retired. Mr. Millikin was assistant business manager of Fortune Magazine from 1948 to 1954 and controller and treasurer of O. E. McIntyre, Inc., from 1954 to 1959.

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TORRINGTON TO EXPAND

The Torrington Co. has confirmed an expansion program to provide a new bearings manufacturing plant near Clinton, S. C., and a wire mill adjacent to its Broad Street Plant in Torrington, Conn. Initial production at the Clinton Bearings Plant will include needle bearings and needle rollers for the automotive, farm im-

NEW

LASSY *Rapid* **LOX**

INSTANT ACTION—"THRED LOCKED" VISE

Assures Powerful Dependable Clamping With Instant Jaw Positioning.



Patented

- Jaw Pressure Is Selective and Repetitive.
- Ideal for Milling, Drilling, Grinding and Jig Boring—of One Piece or Thousands.

Order from Your Industrial Supplier
Mfg: Lassy Tool Co., Plainville, Conn.

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VIMCO *Lights*

SINCE 1919

VIMCO MFG. CO., INC.
400 MAIN ST., HOLLAND, N.Y.

For more data circle 406 on Postpaid Card

plement, outboard engine, power tool and other industries using anti-friction bearings.

The wire mill at Torrington will be a 43,000 square foot plant. Torrington plans to draw its own wire from rods for use in the manufacture of needle rollers and needle bearings.

The modern, single-story plant near Clinton contains 140,000 square feet of manufacturing and office space. The plant site with railroad siding covers about 160 acres. This complete-

ly integrated production plant has the latest materials handling equipment. Entirely self-sufficient, it will produce all tooling required for its operation. The plant design readily permits future expansion.

Robert B. Wassung, former assistant superintendent at the Broad Street Plant, is plant manager at Clinton. Sales and engineering of products made at the Clinton plant will be directed by Torrington's present sales and engineering staffs.

Johnson on the job

At Pullman Standard Car Mfg. Co.

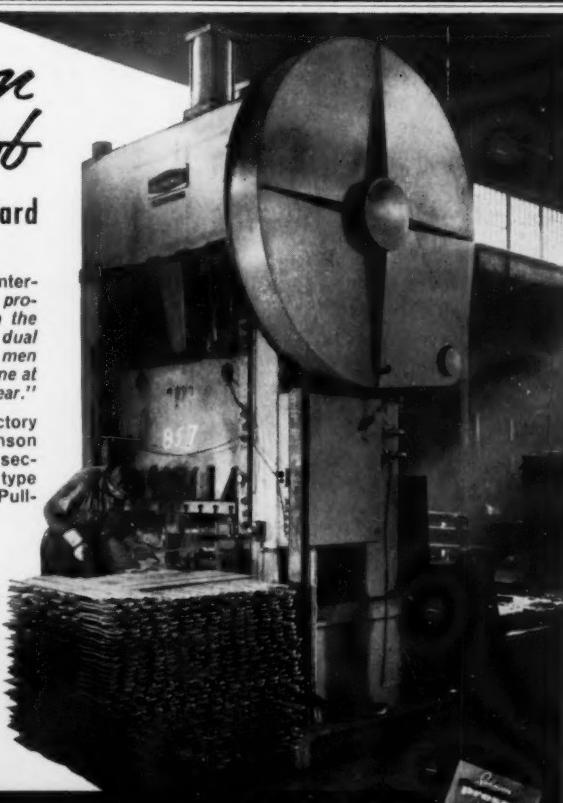
From an "at the plant" interview: "It is anticipated that production will be doubled on the Johnson, because it is a dual capacity press, allowing two men to work at the same time—one at the front, the other at the rear."

Solid proof of the satisfactory performance of the Johnson was demonstrated when a second order for the same type press was placed by the Pullman Standard firm.

50 Models of Johnson Presses

Inclinable,
Straight Side, Gap,
Horn

Special
Presses
Built
To Order



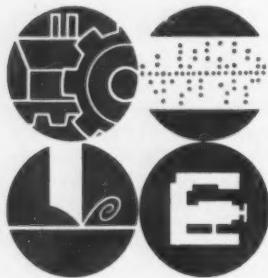
Write for Catalog

JOHNSON MACHINE & PRESS CORP.

620 West Indiana Ave., Elkhart, Indiana



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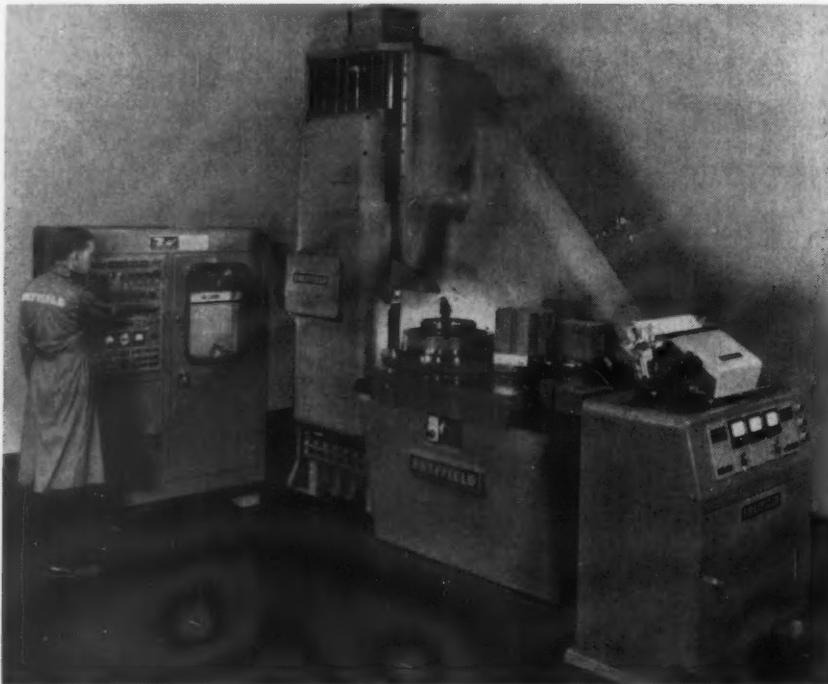


NEW EQUIPMENT

TAPE-CONTROLLED SYSTEM MEASURES PRECISION PARTS

A 16-ton system that is "commanded" by a roll of punched tape and can complete in two hours almost 1,000 precise measurements of a critical

component such as a missile nose cone, has been developed and is now being marketed by The Sheffield Corporation, Dayton 1, Ohio. The jumbo-size gage is so sensitive it can automatically detect a change as small as 10 millionths of an inch in the size of



View of The Sheffield Universal 5-Axis Tape Controlled Measuring Machine, Model TC-101.

and

MATERIALS

relatively large internal and external measurements.

Known as the Sheffield Universal 5-Axis Numerical Tape Controlled Measuring Machine, Model TC-101, the equipment provides the means of obtaining inside, outside and thickness measurements of parts of any shape. The system can quickly locate an almost microscopic spot where a missile part might be "out-of-tolerance." The system simultaneously measures the inside and outside dimensions or the contour of a part, determines wall thickness, and prints the results as well as providing visual readout. It positions and measures the positions of the electronic gaging stylus at any point or angle to within 1/10,000th of an inch in the gaging range of 20 inches in length and height. Wall thickness is measured to an accuracy of 50 millionths of an inch (0.000050-inch).

The versatility of the new system will permit fast, highly accurate tolerance control of a number of key components used in commercial products as well as missiles, space craft and weapon systems. In addition to speed, the system eliminates human error because it can automatically perform thousands of detailed measurements. If required the device can take 100,000 precision readings on a single inch of the part under inspection.

The part to be measured, such as a missile nose cone, rotates on the

positioning table while "Electrojet®" sensing devices, so sensitive that their movements can be amplified electronically 10,000 times, "feel" the inner and outer surfaces, plus the thickness, of the measured part. Contour and thickness data are typed automatically on the printout unit.

The measurement system operates in an atmospherically controlled "cabinet" or room to maintain repetitive environment. Temperature is not permitted to vary more than a small fraction of a degree.

The electronic system makes it possible to "read" the precise dimensions of any part. In this instance, the automatic printout equipment would type out data the engineers need to record part size or to duplicate another part.

The system with its programming input, automatic measurement, visual reading and printout gives all the data engineers need to assure that an ultra-precise and complex product complies with their drawings and specifications. **For more data circle 55 on Postpaid Card**

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HEAT TREATING FURNACE

A multi-purpose heat treating furnace has been introduced by the Cooley Electric Manufacturing Corp., 38 South Shelby St., Indianapolis 7, Ind. Especially designed for small production runs, tool and die heat treating, pilot operations and metal-

new equipment . . .



View shows Cooley Heat Treating Furnace

urgical testing, the furnace maintains temperature accuracy from 300 to 2,000 degrees F.

Features of the furnace include a tight closing vertical door which adjusts to any position, silicon carbide hearth plate, and coils which are permanently located in oxidation and chemical resistant embedding material. Both bench and floor models are offered in two sizes with several control arrangements available.

For more data circle 56 on Postpaid Card

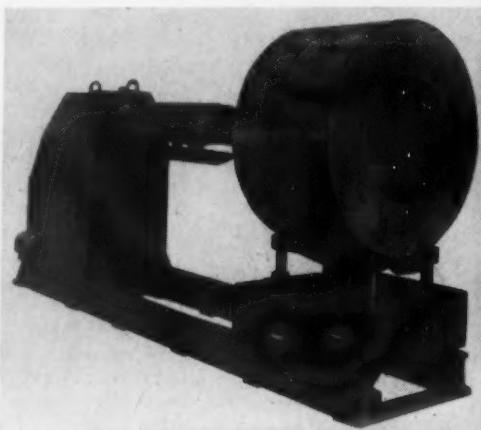
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COIL LOADING CAR

F. J. Littell Machine Co., 4101
North Ravenswood Ave., Chicago 13,

Ill., now offers the Littell S-200 Coil Loading Car as a separate unit. By keeping a reserve coil next to the reel, ready for use, the S-200 eliminates the production delays that occur when one coil is depleted and a crane to bring up a new coil is not immediately available. The S-200's automatic, electronically controlled operation makes it easy for one man to load a 20,000 pound coil on the reel, in a matter of minutes. Damage to reel or coil caused by bumping is eliminated. With smooth hydraulic action, the car raises the coil to proper height, moves the coil forward and onto the reel's contracted expansion arms, lowers from contact with the mounted coil and moves back to position to receive a new coil. The 18 inch lift permits loading a partial coil as well as a new coil.

To protect the reel, the hydraulic control valve can be set to limit lifting power to 20,000 pounds. Then, in the event that the operator inadvertently expands the reel arm before disengaging the loading car, the car will yield to the resulting pressure, protecting both the shaft and arm of the reel.



View shows Littell S-200 Coil Loading Car

The closed hydraulic system prevents sudden lowering action even if the car is loaded and power completely fails. Safety locks provide positive protection against running off the track. The S-200 is complete, ready to be mounted on tracks. Width of rails, or flange to flange distance between wheels is 32½ inches. The tracks must be at least 10 inches high for cylinder clearance.

For more data circle 57 on Postpaid Card

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HORIZONTAL BORING, DRILLING AND MILLING MACHINE

Equipped with Space-Setter readout numerical control, the Gray Horizontal Boring, Drilling and Milling Machine, built by the G. A. Gray Company, Cincinnati 7, Ohio, makes short runs practical and profitable. The Gray Space-Setter System offers progressive steps to full tape control. The readout provides a basic and infallible counting or measuring system. A zero offset feature establishes zero readout at any pre-determined reference piece on the workpiece.

Drawing dimensions can be read on the readout panel.

The Space-Setter System allows accuracies to within 0.001 inch, and is unaffected by line voltage. The precision construction of the Gray Horizontal Boring, Drilling and Milling Machine takes full advantage of the Space-Setter System. A Televersal attachment permits low mounting, resulting in constant rigidity, heavier feeds, and faster cuts. The three spindle work head swivels and can be locked at any alternative angular position for multiple set-up jobs. A self-contained jib crane with a 2000 lb. lifting capacity makes the operator independent of other shop facilities for tool changes. The unit also features a power operated draw bar, and the electric "woodpecker" multi-ton column and head that may be push button set to within 0.00025 inch.

For more data circle 58 on Postpaid Card

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SURFACE GRINDING MACHINE

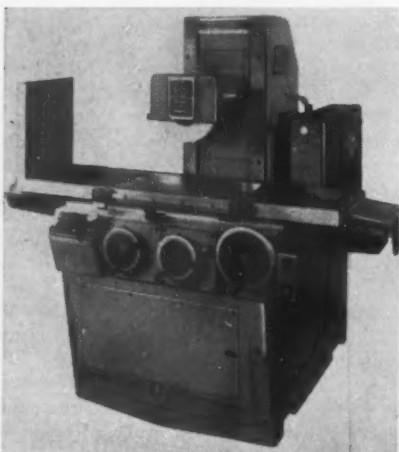
A 12 by 24 inch surface grinding machine has been added to the Brown & Sharpe Mfg. Co., Providence 1, R. I., line of Micromaster surface grinding machines. The machine is specifically designed for use in tool and die shops where its table, which is wide in proportion to its length, can perform highly accurate die grinding. The machine is also well suited for general production work due to its fully automatic operation by the addition of an automatic slot and surface grinding attachment, a wet grinding attachment and a vertical position indicator attachments.

The machine is furnished with a massive anti-friction, permanently lubricated spindle, powered by a 5 h.p. direct drive motor. The spindle is flange mounted, allowing extremely accurate slot or shoulder grinding—a difficult problem in making intricate



Gray Horizontal Boring, Drilling and Milling Machine with Space Setter System

new equipment . . .



B & S 12 x 24-Inch Surface Grinding Machine

die sections. The spindle upright moves on its own vee and flat way transversely, while the table is also mounted on a separate vee and flat way for longitudinal movement. This unique design feature assures long life of the original alignment.

The low pressure unitized hydraulic system is easily accessible and requires very low maintenance. Automatic lubrication to all bearing surfaces is furnished by a separate system. All controls are closely grouped for ease of operator handling.

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PRESS BRAKE

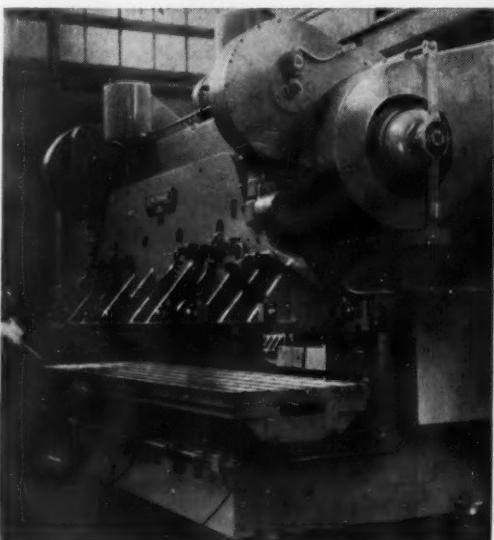
The utilization of added die lengths and widths available in press brake design is typified by the 9 Series by 10 foot Cincinnati (Mechanical) Press Brake, manufactured by The Cincinnati Shaper Co., P. O. Box 111, Cincinnati 11, Ohio, for press application. The machine develops 225 tons at or

near the bottom of the stroke. The 36 inch permanently widened bed and ram provide adequate back up for large die sets. In addition, the double plate bed is equipped with a shelf for the adaptation of die cushions for press applications requiring the use of such units.

To facilitate the use of the overall die length, the press brake is furnished with 12 inch extensions on both ends and is provided with an 18 inch throat, lowered to clear the top rear corner of the 3 $\frac{3}{4}$ inches thick by 36 inches wide "T" slotted bolster plate.

Operator safety is provided by palm buttons adaptable to either the bed or the ram. Added features include remote control to the power ram elevation, 5 inch stroke, air counterbalances, tonnage load indicator, electromagnetic brake on the ram adjusting motor, automatic ram stop at the top of the stroke with non-repeat feature and reversing control.

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Cincinnati 9 Series by 10 Foot Press Brake

For { 8-STATION PRODUCTION MACHINING
1½" BAR AND COLLET WORK
CHUCKING
SINGLE POINT THREADING

This is an all new 1½" bar capacity ram type turret lathe with power feeds to all 8 working stations . . . that in addition to bar and collet work also has the versatility to do chucking, and when needed, single point threading. Powered by a 5 h.p., two-speed, geared motor, the new Sheldon 3 R turret lathe provides 16 spindle speeds, 60 different feeds to the carriage and cross-slide, and 180 different feeds to the ram turret.

The turret itself is ruggedly built and accurately machined to provide close tolerance indexing. And for complete ease of operation, it is put under power by simply pressing a push button on the control panel.

Costs { \$7,167⁰⁰
FOB Factory
Complete with all
standard equipment

This new 3 R Sheldon is completely equipped with two-speed motor and electrical controls, coolant system and splash guards, LO spindle nose, large satin chrome dials and hardened bed ways. It also provides an additional cost saving feature—each turret face is drilled and tapped for your standard flange type tooling as well as being bored for your standard 1½" shank type tooling.

For versatile, accurate machining in either long or short runs, the new Sheldon 3 R provides the answer to low investment cost with high profit operation.



Write for bulletin with complete
specifications and tooling data

SHELDON MACHINE CO., INC.

4250 N. Knox Ave.

Chicago 41, ILL.

Builders of 10", 11", 13", 15" Sheldon lathes, Sheldon Milling Machines,
Sheldon Shapers and Sebastian Geared Head Lathes

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August, 1961

MODERN MACHINE SHOP 149

new equipment . . .

AIR CHUCK

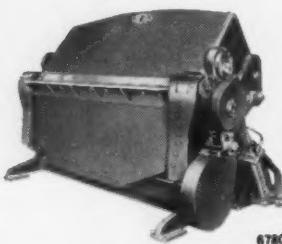
Mollenberg-Betz Machine Co., Inc., 20-26 Henry St., Buffalo 2, N. Y., has introduced an air chuck that will hold a workpiece while it is being worked upon or machined. The air chuck allows the workpiece to be passed entirely through the center of the chuck body due to its open construc-

tion. No external air cylinders or draw rods are necessary to perform the operation function of this self contained unit. No permanently attached air supply lines leading to the air chuck are required for the chuck jaw gripping and releasing operation. Once the air supply is applied to the inlet valve located on the chuck body, the chuck jaws are activated. The air supply can then be removed and the air pressure inside the chuck housing is retained. Because of this self contained design, and with no permanent air supply connections, the chuck is allowed to rotate, move axially or travel in any manner with another machine on which it is mounted, thereby providing maximum flexibility and adaptability for a great many applications.

The construction of the annular ring piston, inside the main circular housing, provides the full force for operating the jaw movement and holding



Many standard sizes are available with capacities for bending mild steel up to 12 feet by $\frac{1}{4}$ inch or 16 feet by $\frac{1}{2}$ inch.



6780

For details on how to do it, ask for Bulletin P-55



Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

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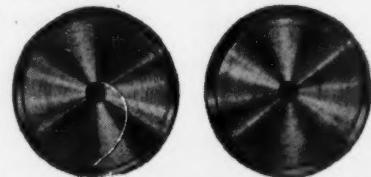
View shows Mollenberg-Betz Air Chuck

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the new RELIEVOMATIC*
saves you costly refinishing!

No more rejects or refinishing because of marred surfaces made by cutting tools on their return pass! Now—the RELIEVOMATIC renders precise parts with perfectly smooth surfaces. For boring, turning or facing on automatic metal turning equipment.

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normal marred surface

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perfectly clear surface
with RELIEVOMATIC!

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Nightingale 9-8600

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OF KALAMAZOO

Model
"400"



HORIZONTAL
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4"
ABRASIVE
BELT GRINDER

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People work better when they SEE BETTER®



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MAGNI-FOCUSER

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For increased production, greater accuracy, fewer accidents and errors, use the MAGNI-FOCUSER—the new 3-D binocular magnifier with matched prismatic lenses. It provides needle-sharp vision — greatly magnified and in third dimension.

Scores of industrial jobs are being aided by the MAGNI-FOCUSER. It reduces eye strain and avoids squinting; leaves both hands free to work. It's light weight; can be worn with or without eyeglasses; normal vision resumed simply by raising the head.

Speed your production by ordering now on 10-day trial basis without obligation. Only \$12.50. Immediate delivery. Or write for illustrated folder.

the 3-D Magnifier that speeds production and leaves both hands free to work

new equipment . . .

power, allowing the jaws to all move equally and simultaneously; resulting in self centering of the workpiece within a tolerance of plus or minus 0.002 inch total indicator reading. Total holding pressure exerted on the workpiece is a function of the air supply pressure and the mean diameter at the chuck ring piston, designed to operate on normal plant air pres-

sure. The air is exhausted from one side of the piston and pressure applied to the other side, thereby providing pressure operation for both clamping and releasing. Standard models are provided with a $\frac{1}{8}$ inch movement per jaw, allowing $1\frac{1}{4}$ inch diametrical movement. Chucks are available from 12 to 48 inch inside diameter, and may be used as a rotating or stationary chucking device, either horizontally or vertically mounted. These features

make this chuck adaptable to many applications on standard machine tools.

For more data circle 61 on Postpaid Card

★ mms ★

WHEEL DRESSER

A. B. Craley & Son, 60 Knight Ave., Clementon, N. J., has introduced a diamond emery wheel dresser that is designed to eliminate the necessity of running the wheel up or down to diamond level to dress and, after

PROVED ACCURACY AT LOWEST COST from L-W America's Largest Builder of DIRECT INDEXING DIVIDING HEADS



MODEL SDD	$6\frac{1}{2}$ " swing. Spindle threaded $1\frac{1}{2}$ "-8. 36 lbs.	\$215
MODEL BPD (shown)	11" swing. For plain milling machines. Spindle threaded $2\frac{1}{4}$ "-10. 140 lbs.	\$345
MODEL AUD	11" swing. Fully universal. For complete indexing and spiral cutting. Spindle threaded $2\frac{1}{4}$ "-10. 190 lbs.	\$510

Right or left hand types. Large tapered bearing adjusts for end play. Worm wheel and alloy stress-proof steel shaft can be fully disengaged. Ball bearing thrust on worm shaft and rear of spindle. Head tilts past 90° . Swivel base and rising blocks available. 3 index plates for dividing all numbers to 50, even numbers to 100 except 96T. Chart shows all divisions obtainable to 380.

Send for literature, giving dealer's name.

L-W CHUCK CO. 28 SOUTH ST. CLAIR STREET
TOLEDO 4, OHIO

Lathe and Magnetic Chucks • Milling Machine and Drill Press Vises

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Craley Accurate Set
Emery Wheel Dresser

surface
harden
TOOLS &
PARTS
without
special
equipment

KASENIT COMPOUNDS

For use in tool rooms and machine shops, Kasenit is deep-penetrating, eliminates soft spots and warping. Absolutely safe, easy to use. Booklet B tells how these compounds can help you. Write now! Available direct or from leading industrial distributors.

KASENIT CO. 12 KING ST., MAHWAH, N.J.

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to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.



Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool!

HEIMANN MFG. CO. • URBANA, OHIO

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THE BIGGEST LITTLE PUNCH

6 1/2" THROAT DEPTH

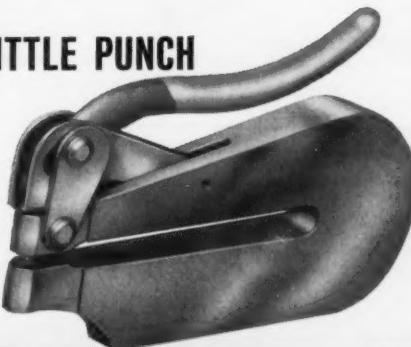
CAPACITY

1/4" HOLE THRU 16 GA. MILD STEEL
DEPTH OF THROAT — 6 1/2"

ONE PUNCH AND DIE INCLUDED
(Your choice 1/16" to 9/32" by 1/4")

WEIGHT
10 LBS.

Write now
for complete
information
and prices



No. D-5 DEEP THROAT PUNCH

WHITNEY METAL TOOL COMPANY

720 Forbes St., Rockford, Ill.

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new equipment . . .

dressing, the necessity of running up or down to find the work level. With Craley Accurate Set Wheel Dresser, the diamond is set to the height of the work to be ground and then the wheel is dressed. The diamond, the wheel and the work are now on the same level. When work is to be ground to a specific size, the diamond is set

at the required height by means of adjustable parallels or blocks, the wheel is dressed and, when grinding is completed to that setting, the required size for the work has been obtained.

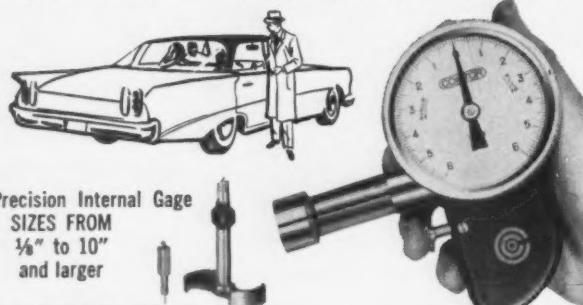
The dresser contains a .75 African diamond of good quality, with several resetting possibilities. This size diamond is recommended for wheel up to 1 inch by 10 inches. A drill template is furnished for locating position of holes for mounting the dresser on a magnetic chuck. The dresser is available in five sizes. For more data circle 62 on Postpaid Card

★ mms ★

DUST COLLECTOR

A series of centrifugal dust collectors has been developed by Torit Manufacturing Co., 1138 Rankin St., St. Paul 16, Minn., to provide up to 2,500 c.f.m. of air with a 5 h.p. motor. With greater capacities under comparatively low horsepower, the Model 20 cyclone separators expand the Torit line of Industrial Dust Collectors and extend the number of applications possible. Capacity of the Series No. 20-3 (3 h.p.) ranges from 1,250

**The odds are 2 to 1 that the transmission
in your new car was gaged by Comtorplug**



Precision Internal Gage
SIZES FROM
 $\frac{1}{8}$ " to 10"
and larger

COMTORPLUG with interchangeable expanding plugs to gage
simple or special holes from $\frac{1}{8}$ " to 10" diameter.

UNIQUE ADVANTAGES

Shows exact size, with large graduations easily read within .0001".

Detests front or back taper, ovality, bell mouth, barrel shape.

A fixed — not passing — reading.

Automatic features assure uniform gaging free of user influence.

Genuine 2-point gaging, automatically aligned and centered.

Used at machine . . . on work still in chuck . . . at bench . . . on floor.

Free from wires, hose, electronic gear.

In the majority of U. S. cars, this unique 2-point gage is at work — also in jet engine, home appliance, electric motor and other volume-precision programs.

Especially valuable AT THE MACHINE because at moderate cost it gives automatic precision within .0001" and enables you to get maximum results from your precision equipment.

GET THE FACTS Request BULLETIN 51 →
The Comtor Co., 64 Farwell Street, Waltham 54, Mass.

C O M T O R P L U G

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CUTTER GRINDER
for sharpening your
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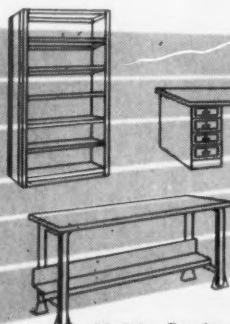
bles for Production, Tooling and Maintenance now. 70 different models and types—vise jaws from 1½" to 8".



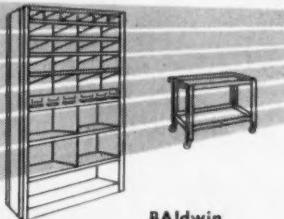
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PALMGREN PRODUCTS
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Bay
PRODUCTS DIV.
AMERICAN METAL WORKS INC.

1827 W. Cambria St., Philadelphia 32, Pa.

For more data circle 421 on Postpaid Card

August, 1961

MODERN MACHINE SHOP 155

new equipment . . .

to 2,000 c.f.m. and the No. 20-5 (5 h.p.) to 2,500 c.f.m. Variations of these separators include models with after filters for indoor exhausting and enlarged dust storage and hopper capacities. A total of 12 models is available in the No. 20 Series.

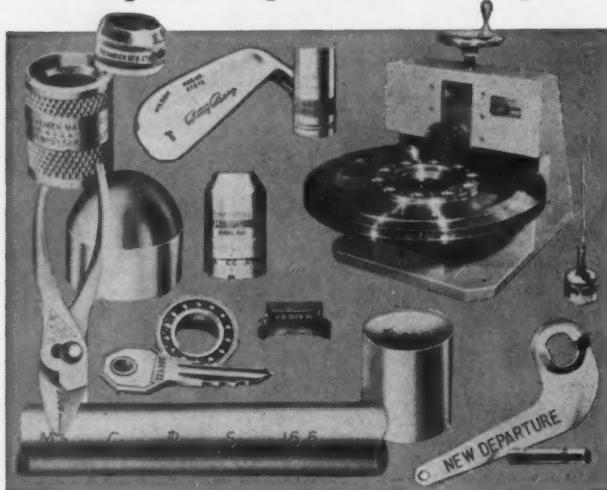
Space requirements have been reduced with the machines. The standard No. 20-5FM Model, for instance,

occupies a floor area of only 6 1/4 square feet. Its height is 113 feet. It has a convenient drawer with 7 cubic feet of dust storage capacity.

While primarily designed to handle materials like dust, chips, shavings, and blocks from wood, metal and plastics, the Series No. 20 shows excellent efficiency with materials having the consistency of flour, and so on. The blower features a self cleaning, radial design wheel, developed to handle light materials without clogging. The fan is also located on the "clean" air side of the unit to prevent damage from large or heavy pieces of material, and is top-mounted for ease of installation as well as conservation of floor space.

The Torit Collector has a long tapering cone design and high inlet velocity. Built of heavy gauge welded steel, the Series No. 20 Separators have

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Simple hand units or electronic marvels; all provide the simplest, most economical marking for special applications. Write, giving details or send sample product.



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156 MODERN MACHINE SHOP



Torit Dust Collector

August, 1961

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complete with cord, plug, switch ready to use.

Work table in vert. illus. optional.

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A few desirable distributor territories still available

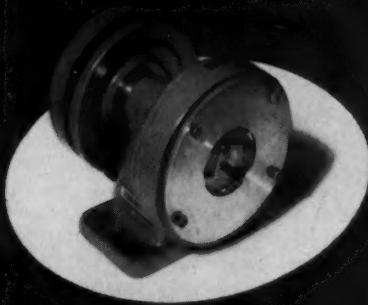
WALLS SALES CORPORATION

59-63 Van Dam St. Brooklyn 22, N. Y.

For more data circle 425 on Postpaid Card

August, 1961

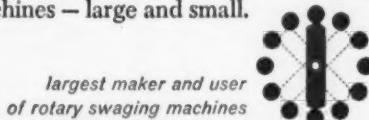
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at high speed and low cost without wasting an ounce of metal, with

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Torrington, Connecticut

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MODERN MACHINE SHOP 157

new equipment . . .

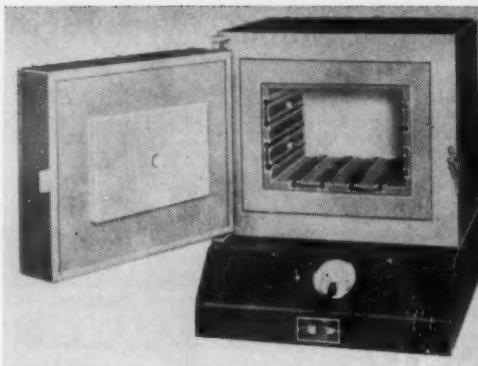
8-inch inlets and 10-inch outlets. Motor and blower are end-mounted and detachable for easy relocation of the outlet duct. Cones may be rotated on their bases for most convenient inlet location. A protective weather-cap and weather resistant finish are available for outdoor installations.

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ELECTRIC FURNACE

According to the manufacturer, L and L Manufacturing Co., 804 Mulberry St., Upland, Chester, Pa., infinite zone control switches on Dyna-Trol Industrial Electric Furnaces control the rate of temperature input; these control switches allow for complete and accurate equalization of vertical zone temperatures at any time-temperature curve. When the desired temperature level has been reached,



L & L Dyna-Trol Industrial Electric Furnace

between 500 degrees F. and 2300 degrees F., it can be maintained to a plus or minus 3 degrees F. dead zone or control band. Line voltage fluctuation is automatically compensated.

Each Dyna-Trol furnace is equipped with a temperature indicating



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FAST SET-UPS — automatically compensates for misalignment up to $\frac{1}{16}$ " on dia. between machine spindle and work.

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◀ **SIZES and types to fit all machines used for tapping and reaming.**



**Hold positive hole
location tolerances**



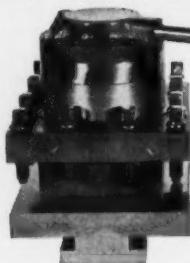
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... to plus or minus .0003

The Multiple Gear Tooth Crown Clutch with its zero backlash splined member ensures continual precise indexing

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**OLSON INDUSTRIAL
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SOFT BLANK TOP JAWS

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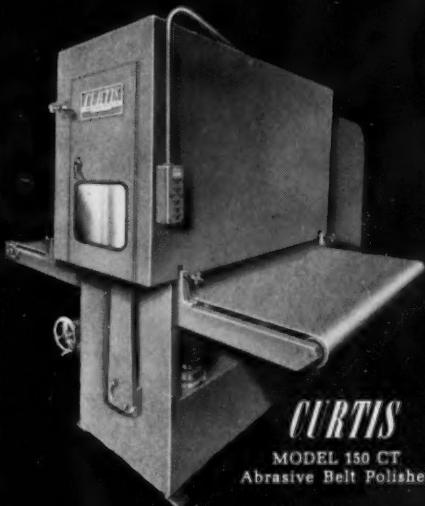
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high speed sheet polishing

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For your copy—Model 150 Brochure write to: Curtis Machine Division, The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM



CURTIS
MODEL 150 CT
Abrasive Belt Polisher

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August, 1961

MODERN MACHINE SHOP 159

new equipment . . .

pyrometer, two thermocouples and selector switch. The pyrometer features an open face design, permitting full visibility; pyrometer is accurate, registering plus or minus two percent of full scale deflection. The thermocouples are heavy chrome-allumel wire for extra long life. For comparing vertical zone temperatures, a two-position thermocouple selector is

provided with the Dyna-Trol Furnace.

Additional features include Dyna-Glow refractory element holders; these insure excellent distribution of radiation, and require twenty-five percent less input to reach any given temperature. The low watt to weight per element holder ratio offers fast recovery time when recharging the furnace.

The Model P63, a front loading bench model, measures 20½ by 19 by 24 inches outside dimensions. Smaller and larger bench models are available,

as well as compact floor units. Each unit features high quality fire-brick, two-tone heat-resistant paint, cold rolled steel case. Preformed insulating brick interiors are provided for easy disassembly and repair if ever necessary.

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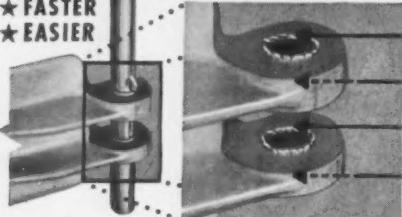
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DIAL INDICATORS

Two precision dial indicators have been introduced by The L.

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DEBURR THESE INACCESSIBLE
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1 Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter blade against the workpiece quickly deburrs the outside surface.

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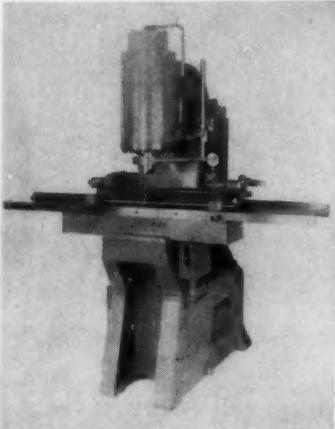
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6860 Farmdale Ave., No. Hollywood, California

N-11



Starrett Dial Indicator

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New 15-Ton Straightening Press Model #S-15-D-E with spring centers. One handle to control ram and pressure exerted. Hydraulics and electrics are inter-connected.

See your Dealer or write for Catalog M-44

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BAR and TUBE PRINTER for hand or conveyor use



Rolled by hand along rounds or flats, or mounted over conveyor rolls, this printer provides simple, economical identification code printing. Guide rolls adjust and center printing wheel for clear marking on metal or plastic $\frac{1}{4}$ " diameter up.

Wheel accepts E-Z Set rubber type in single type characters or complete legend in one strip. Easily pressed into place, or stripped off for quick change.

Sponge rubber ink roll holds enough ink for 8 hours; easily interchanged for color code change.

Lightweight magnesium frame, rugged construction; weight $7\frac{1}{2}$ lbs. Write for literature, Model T-55.

PANNIER MASTER MARKERS

308 Pannier Bldg., Pittsburgh 12, Pa.

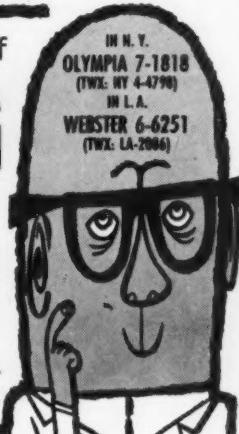
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PERMAG PACIFIC CORP., 2910 S. LA CIENEGA BLVD., CULVER CITY, CALIF.



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WEBSTER 6-6251
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August, 1961

MODERN MACHINE SHOP 161



new equipment . . .

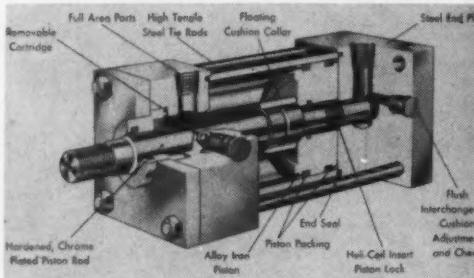
S. Starrett Co., Athol, Mass., which are said to have an accuracy of plus or minus 0.0005 inch for the 0.015 inch total range (2½ turns). The Starrett No. 25-109 is a balanced dial indicator with a range of 0-3-0, one revolution 0.006 inch, total range 0.015 inch. The Starrett No. 25-205 is a continuous dial model, reading 0-6, one revolution 0.006 inch, total range 0.015 inch. Both indicators are furnished with jeweled bearings.

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Series A2 Cylinders, a complete and economical pneumatic and hydraulic line, have been announced by The S-P Manufacturing Corp., 30201 Aurora Rd., Cleveland, Ohio. The Series A2



S-P Series A2 Air and Hydraulic Cylinders

Cylinders have both the cushion adjustment and ball check flush in the cylinder end plates, saving space and eliminating clearance problems. Since both are interchangeable, maximum installation flexibility is achieved together with greater convenience for cylinder adjustment.

S-P's removable cartridge also makes servicing easier and faster. This self-

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BUILT FOR THE MOST CRITICAL

Whether the need is for extreme accuracy, adaptability for unconventional set-ups or exceptionally wide range of divisions, ELLIS fills the bill.

BUILT IN 3 SIZES
6½", 8" or 10" swing
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floating index plate.

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Prompt delivery. Send for prices—or send tools for repair.
All work guaranteed.

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NO SHORTENING! NO DISTORTION!

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NU-TANGS INC. 1339 Bates Avenue
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AUTOMATIC INDEX TABLES

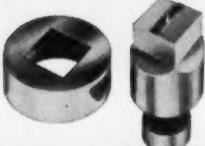


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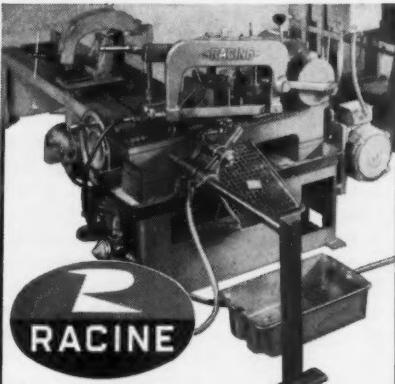
DI-ACRO CORPORATION

formerly O'Neill-Irwin Mfg. Co.

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August, 1961



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RACINE

hack saw type

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save you man-hours

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- Automatic stock feeds for multiple bars

reduce your cost per-piece

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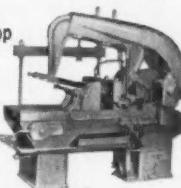
dependable for long life

- Oil-smooth hydraulic-powered feed
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- Require little adjusting
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RS-118

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models, 6" x 6" to
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new equipment . . .

contained easily-replaceable unit has compensating lip-type wiper seal, flexible self-adjusting multiple-lip rod seal and an extra long bronze bearing that provides maximum rod support when the piston rod is extended.

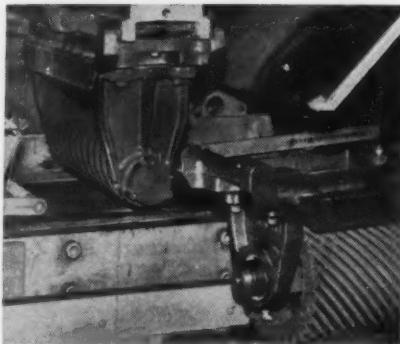
Built to major automotive manufacturers' and JIC standards, S-P's Series A2 Cylinders are available in 11 bore sizes from 1½ inches through 14 inches with 25 mounting styles and a wide range of piston rod diameters. Full area ports for greater cylinder and Heli-coil insert piston lock are other quality features of S-P's A2 line.

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SMALL CONTACT WHEEL

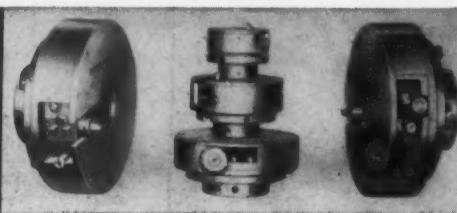
Rough grinding operations can be done faster with a 3 inch diameter con-



3-Inch Diameter Contact Wheel designed for Tri-Matic Oscillating Belt Grinder

tact wheel developed for use on the Tri-Matic Oscillating Belt Grinder in place of the standard 7 inch wheel according to the manufacturer, Sales Service Mfg. Co., 2361 University Ave., St. Paul 14, Minn. Because the contact

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MUMMERT-DIXON COMPANY

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Hanover, Penna.

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wheel is not the driving wheel on the Tri-Matic it is possible to use a smaller diameter in place of the regular 7 inch wheel. The 3 inch diameter wheel reduces the arc of contact between the abrasive belt and the work resulting in faster, cooler cutting. This is said to have special advantage on rough operations such as descaling, heavy deburring and stock removal.

The 3 inch diameter contact wheel is furnished in a mounting which replaces the standard 7 inch wheel and mounts in minutes without any extra adjustments. Because the belt length is not changed, the regular belts used with 7 inch wheels can be used with the 3 inch wheel. The wheels are available in various durometers.

For more data circle 67 on Postpaid Card

★ mms ★

INDEXING DEVICE

Developed by Michigan Tool Co., 7171 E. McNichols Rd., De-



Model MOX-3600
Indexing Device

August, 1961

troit, Mich., the Model MOX-3600 is a compact, high-precision indexing device with an optical mirror mounted on its rim. It is accurate to within 0.000012 inch at a 20-inch diameter.

When used with an autocollimator or similar optical sighting device, the optical polygon provides an accurate mirror surface which reflects the projected image of the sighting device's cross hairs. The amount of deviation

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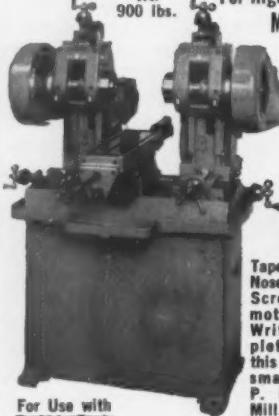
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at low cost

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duction with Linley Noise-
less Riveters. We'll give you,
without obligation,
cost and time estimates of
doing it the Linley way
if you'll send us samples
of parts to be riveted.

Linley Riveters will do
rivets up to $\frac{3}{8}$ " in diam-
eter in iron and cold
rolled steel; larger sizes
in brass, aluminum, etc.

Send for Bulletin R Today.

LINLEY BROTHERS CO.

Also Builders of JIG BORERS
671 State St. Ext., Bridgeport 1, Conn.

For more data circle 443 on Postpaid Card

166 MODERN MACHINE SHOP

new equipment . . .

between the reflected image and the graduated cross hairs in the sighting device gives a geometric check on misalignment, parallelism, angularity, and so on.

For more data circle 68 on Postpaid Card

★ modern machine shop ★

7 INCH GRINDER

Advanced safety devices plus con-
venient handling of odd-shaped and
long stock are features of an improved
Walker-Turner 7-inch, $\frac{1}{2}$ h.p. grinder
developed by Rockwell Manufacturing
Co., Walker-Turner Div., 400
North Lexington Ave., Pittsburgh 8,
Pa. The grinder is available in both
bench and pedestal models.

The unit's "Twin-Lite" safety
shields contain double-strength, shat-
ter-proof glass to protect the operator's
eyes. Inside the shields, bayonet-type
bulbs are shaded to prevent glare
while illuminating the face and both



View of Walker-Turner 7 Inch Grinder

sides of the wheel. The wheels are balanced to 1/10 inch-ounce.

Additional safety features include removable steel plates covering the sides of the wheels, adjustable spark deflectors, large (2½ inch diameter) cupped wheel flanges, and heavy cast iron guards with integral dust chutes. These chutes utilize the natural fan action of the grinding wheels, making installation of dust collectors an easy job.

Design of the grinder is aimed at providing the greatest possible convenience in handling odd-shaped and long stock. Oval end bell hubs provide top-to-bottom thickness for rigidity and front-to-back thinness for easy manipulation of work. The hubs are extra long, a feature that combines with the slim design of the grinder's "Thin-Line" motor to allow ample clearance for all stock.

The single-phase motor is a capacitor-start, 115/230-volt, ½ h.p. unit with double sealed ball bearings plus an extra seal to keep abrasive dust out. It is available in 1725 and 3450 r.p.m. models. Three-phase motors are also available.

Tool rests lock in place with a single mounting screw that permits easy removal for attaching accessories, like the drill grinding attachment. The rests adjust for any grinding angle and have special ledges for grinding on both sides as well as the face of the wheel.

For more data circle 69 on Postpaid Card

★ modern machine shop ★

COUNTERSINKS AND CHAMFERING TOOLS

Smooth, clean deburring, countersinking and chamfering are said to be assured with the use of Precision-Marwa Adjustable Countersinks and O. D. Chamfering Tools which are being offered by Precision Tools and Products Co., 1 Washington Ave.,

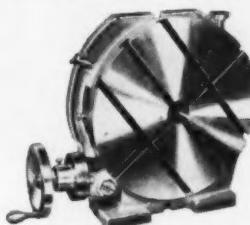
• TROYKE • ROTARY TABLES

A Size and Model
for Every Need



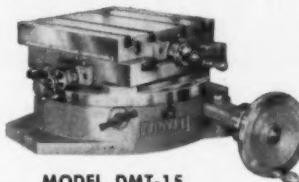
HORIZONTAL

8 Models—Sizes 9", 12", 15", 18", 25"

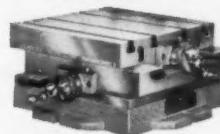


HORIZONTAL AND VERTICAL

4 Models—Sizes U-9, U-12, U-15, U-15-4



MODEL DMT-15



MODEL CS-12

Cross-slide accuracy: within .001" total in 10" of travel.
Angular accuracy 60 seconds or less on all models.

FREE: Catalog on Request

"Rotary Tables Are Our Business"

TROYKE MFG. CO.

Cincinnati 41, Ohio

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MODERN MACHINE SHOP 167

August, 1961

new equipment ...

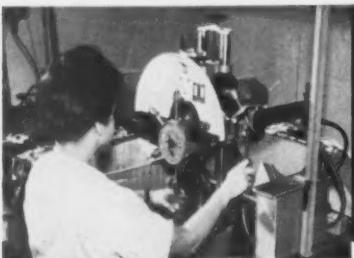
Providence 1, R. I. Each tool is made of one-piece M 2 high speed steel, cylindrically ground to a perfect cone (inverted cone in the chamfering tool). A slot is cut back from the working end, with the two cone sections brought together by an adjusting screw. By altering this adjustment during setup, the cutting edge is

brought out-of-round, creating the clearance angle desired. The tools are self-centering, and can be hand-fed safely even on interrupted cuts.

Since the clearance angle is adjustable, these same tools may be used on a variety of materials such as steel, aluminum, brass, plastics, laminates, and so on. Sharpening is simple too, since the perfect cone shapes are ground in one straight cylindrical operation — similar to a lathe center—with no relief or clearance angles to contend with. Each tool has an exceptionally long resharpening life.

Precision Marwa Countersinks are available in standard angles of 60, 82 and 90 degrees. O. D. Chamfering Tools are available in 60 and 90 degree angles. Both units are offered in various sizes up to 3½ inches in diameter.

For more data circle 70 on Postpaid Card



**PREST-O-MATIC CO.
increases
tap life
by 100%....**

Increases Production by 25%

with TAPMATIC TAPPING ATTACHMENTS

Because of their extreme sensitivity and their ability to adjust the torque for different size taps (which is not possible with conventional tappers), the Prest-O-Matic Company, Santa Ana, California has installed two Tapmatic Tapping attachments on a bench model turret drill. At speeds of 650 rpm, two holes are bottom tapped 6-32 and one hole is tapped at .212-36 in the die cast aluminum valve bodies. Prest-O-Matic reports 100% longer



tap life, production increased by 25% and elimination of rejects.



**Send for
New
Bulletin**

**DRILL
SPEEDERS**



View shows Precision Marwa Adjustable Countersinks and O. D. Chamfering Tools

TAPMATIC

CORPORATION

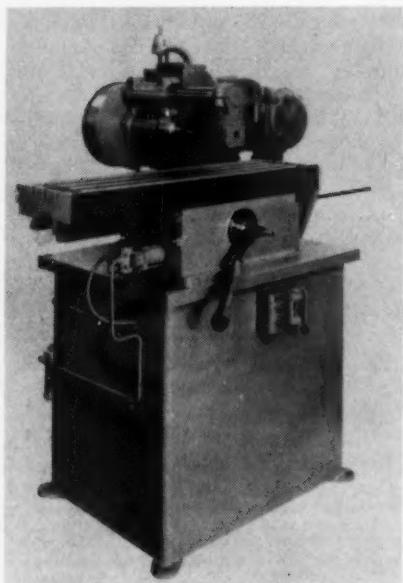
845 West 16th Street • Costa Mesa, California • Liberty 8-3404

For more data circle 445 on Postpaid Card

**SPECIAL MILL ADAPTATION
FEATURES HEAVY BOX TYPE
TABLE AND SLIDE**

U. S. Burke Machine Tool Co., 3 Brotherton Rd., Cincinnati 27, Ohio, has developed a mill, adapting its standard No. 1 U. S. Half/Mill with a heavy box type table and slide. Designed to provide rapid production rack and pinion longitudinal hand table feed, the mill adaptation features both air-hydraulic and manual rack and pinion longitudinal table feed.

The Half/Mill column is mounted on a cross slide for in/out adjustment, thus permitting the use of the rigid, one piece, extended bed type longitudinal slide mount. An overarm support gives added rigidity. Capable of high performance slotting, sawing, face milling, keyway cutting, slab milling, boring and many other operations, the



*View of U. S. Burke Half/Mill Adaptation
featuring heavy box type table and slide.*

August, 1961

New! \$15*
ONLY . . .

**BUYS THIS COMPACT
MIST COOLANT UNIT**

TRICO

**TYPE
"J"**



***Complete With
Magnetic Nozzle
Holder As Shown**

(In U.S.A.)

Especially designed for small precision machinery used for drilling, tapping, sawing, grinding, etc. Up to 500% savings through increased cutting speeds and tool life. Check these quality features and write for complete details.

- —compact . . . measures 3" x 5"
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- —attaches to existing shop airline
- —shatter-proof 8 oz. reservoir
- —neoprene flexible coolant line
- —magnetic nozzle holder positions anywhere
- —controlled discharge

Larger Types and Capacities Available.

SEND FOR BULLETIN 37

**TRICO FUSE MFG. CO.
MILWAUKEE, WIS. U.S.A.**

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MODERN MACHINE SHOP 169

new equipment . . .

versatile U. S. Burke Half/Mill line provides selective spindle speeds up to 5000 r.p.m. Vertical rise and fall feed is 4½ inches, cross feed 6 inches, with longitudinal feeds available from 16 to 36 inches. Selection of table sizes range from 6½ by 27 inches to 10 by 54 inches working surface. The head and motor are balanced on a common,

bearing-supported pivoting arm for sensitive vertical movement. The motor bracket swivels to facilitate belt changing, with the steel guard hinged on top for additional convenience and safety. Pulleys are interchangeable.

For more data circle 71 on Postpaid Card

★ MODERN MACHINE SHOP ★

TRANSISTORIZED PORTABLE BALANCER

Gisholt Machine Co., Madison 10, Wisconsin, has announced the addition of a transistorized portable balancer to its extensive line of balancing machines. The portable balancers feature building block design and selector switch operation to provide direct, usable answers for the large variety of vibration and balancing problems occurring in rotating members of various assemblies or permanent installations. Small size and light-weight make them ideal for on-location use in preventative maintenance programs that take the harmful effects of unbalance in rotating components into consideration.

The Gisholt Masterline Portable Balancer is not designed for use in production balancing operations. It can be used to advantage as permanent installations in test stands at oil and chemical plants which house numerous large rotating elements. The test stands need be no more complex than a spring-mounted plate upon which the assembly being tested rests.

"GEM" AIR VISES — "for greater capacity"



#2 GEM Air Vise—Instantly adjustable to any capacity up to 6½".

\$120.00 delivered, guaranteed.

Also GEM AIR VISES from 3" to 12" capacity.
Write for details.

J. E. MARTIN MACHINE CO. • SPRINGFIELD, OHIO

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IF YOU WORK WITH SHEET METAL YOU NEED THE



**LENNOX
METLMASTR®**

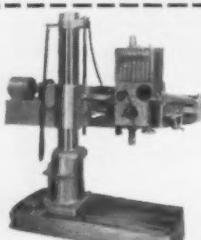


(see our insert in Sweet's Machine Tool file or)

WRITE—PHONE—WIRE

Lennox Tool & Machine Builders
Lima, Ohio

For more data circle 448 on Postpaid Card



write for free catalog on this high-speed radial

Here's a low-cost radial for modern high-speed drilling: 12 speeds up to 3200 rpm; spindle speed ratio of 40/1; automatic tapping reverse; adjustable spring counterbalance; hardened tang slot; safety elevating nut and screw; spindle mounted on 5 precision ball bearings; 9" column with 3' or 4' arms.

THE CINCINNATI GILBERT MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

For more data circle 449 on Postpaid Card



Gisholt Transistorized Portable Balancer

Greatly simplified procedures are possible with force (single-plane) and moment (two-plane) indications provided for use in large buildings, ships,

and even aircraft where periodic balancing of large blowers and other permanently installed rotating elements is necessary or desirable. Machine manufacturers can use the Gisholt Portable Balancer to check rotating assemblies where vibrations need to be isolated, measured, located and corrected. Other application areas include certain types of automotive repair stations and commercial garages.

The Masterline Portable Balancer can also be used as a "built-in" monitoring device in certain facilities. A building block design approach was used by Gisholt to obtain maximum flexibility and the necessary versatility to meet all requirements for use in the various types of installations listed above.

Four different amplifier and control unit combinations are offered. The simplest consists of a vibration amplitude indicator and filter, for monitor-

New VOGEL AUTOMATIC CUT-OFF MACHINES

Pneumatic or Hydraulic

Units shear clean to accurate lengths FAST with practically no burr or distortion

SAMPLES ➤
were sheared off
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Machines.

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1823 NORTH 32nd AVENUE • STONE PARK, ILLINOIS
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SELF contained
CUT-OFF unit complete
with base cabinet, all neces-
sary switches and controls,
ready for operation.

new equipment...

ing use. The second is a unit with a vibration amplitude indicator, filter, angle (phase) meter and tachometer for single plane checking and correcting. The third includes a vibration amplitude indicator, filter, plane separation networks and calibration controls for two-plane operations. The most universal unit houses three meters (angle-amount-tachometer), a filter control, left and right plane separation networks and controls, an angle-phasing switch and a selector switch.

This last-mentioned unit can be used for all types of single and two-plane operations. This includes use for static (single-plane) balancing with a check for moment (dynamic) balance. Vibration amplitude at pickup location can be indicator, or, by switching, the exact amount of unbalance can be shown in terms of the

correction method used, and exact angles can be shown in one or two-planes of correction, as required. For test stand use, the maintenance shop, where each part being balanced has a different configuration, will get a production advantage from the force and moment correction feature. For balancing similar parts, the direct, two-plane correction indication would be used.

For more data circle 72 on Postpaid Card

★ modern machine shop ★

BEARING BRONZE COATED PISTON AND GUIDE RODS

Thomson Industries, Inc., Dept. D4, Manhasset, N. Y., has introduced a rod material called Bronze Case in combination with hardened steel bushings for piston and guide rods and similar linear applications. Bronze bearing material is put on the large area of the shaft instead of being con-

BORING BAR

by
MODERN



**KILLS VIBRATION,
CHATTER!**

Scientifically designed to diminish vibration in boring, the MODERN boring bar has various size holes drilled from each end to minimize harmonic vibration. Hole diameters were determined by using a VIBRATION METER and probing bar every $\frac{1}{4}$ ". The cavity is filled with shock absorbing material under vacuum, thus obtaining a dead bar of superior strength.

MODERN
MANUFACTURING CO., Inc.
680 Davisville Road, Willow Grove, Pa.

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172 MODERN MACHINE SHOP



TAPER PINS



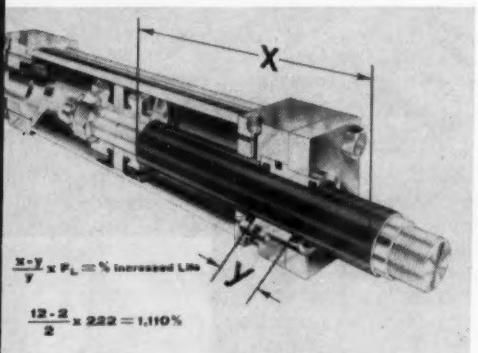
For uniformity and accuracy our Taper Pins are unexcelled. They are milled from special screw machine steel bar stock (or stainless steel or brass), true to taper and to extremely close tolerances. Our leadership in the field enables us to provide all standard sizes from 7/0 to 14 for bulk or assortment shipment. In addition we can furnish, upon request, special needs such as screw ends and dowel pins.

Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and gear rack.

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 452 on Postpaid Card

August, 1961



View of Bronze Case Piston and Guide Rod

fined to the bearing area within a bushing. This provides substantial reductions in the cost of bushing and rod replacements and materially reduces downtime production losses. The cost of lubrication is reduced as well as the

size and weight of many mechanisms. Using Bronze Case rods and hardened steel bushings also is said to increase operating efficiency and can frequently eliminate stick-slip and chatter. In addition, the combination eliminates rust and nick problems.

High quality bearing bronze is fused on the surface of a steel rod which is subsequently ground and straightened to very close tolerances. The bronze fusing is done by a high temperature spraying operation which forms a coating of controlled porosity for excellent lubrication retention. The lubricants don't wipe off. Additionally, the amount of lubricant stored is enormous since it is stored all over the relatively large shaft surface.

With Bronze Case, the effective bearing length is increased by the length of stroke and therefore the wear is greatly reduced as it is spread over

NUMBERALL

CUTS THE COST OF STAMPING NUMBERS

DETAIL CHASE and PUNCH
for Quick Stamping of Nameplates



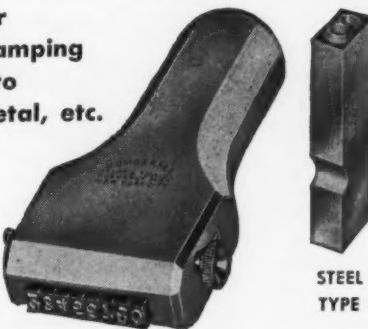
MODEL 24

An ingenious tool for rapid stamping of plain, etched or embossed nameplates. Used in a small Kick or Power Press, or in our No. 93 or No. 131 Bench Press. Steel Type and Logo Type are dropped into recess. Logo Type are used for numerical and letter combinations. All lines are stamped in one operation, making tool very efficient. Small, as well as large lots can be stamped economically, neatly. Write for Bulletin MS-24.

We can also make steel type with round face characters.

IMPROVED TYPE HOLDERS

for
stamping
into
Metal, etc.



STEEL
TYPE

Hand or Press style. Type can be easily, quickly loaded and unloaded. Simplest construction . . . Just a sturdy pin holds the type securely. No screws nor springs. Super-quality steel type made in various sizes: $\frac{1}{32}$ " up to $\frac{1}{2}$ " figures and letters. Write for Bulletin MS23H.

NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

For more data circle 453 on Postpaid Card

August, 1961

Steel type and wheels available with round face characters.

MODERN MACHINE SHOP 173

new equipment . . .

such a large area. Actually the increase in life of the parts is usually more than the ratio of length of stroke divided by the bushing length because of better lubrication.

Bronze Case rods made of AISI 1060 steel, heat treated to 213,000 p.s.i., are available. This greater strength affords savings in cost, weight and space in many new designs by use of smaller rods and bushings.

Since the porous bronze surface maintains superior lubrication over the entire length of stroke, friction losses are reduced resulting in greater operating efficiency. In some applications this permits the use of smaller motors and drives. Also, better lubrication frequently solves problems of stick-slip or chatter. Bronze Case rods are rust-proof and also nickproof since the raised material around a nick is soft and is promptly burnished smooth by

the hardened steel bushing. This provides more savings from less packing or seal replacement.

For more data circle 73 on Postpaid Card

★ modern machine shop ★

PLATE STEEL

USS Fremax 45, a strong free-machining plate steel, has been announced by United States Steel Corp., 525 William Penn Place, Pittsburgh 30, Pa. USS Fremax 45 has a relatively high tensile strength and yield point, with a carbon content of .40/.50. It was developed for special high strength, wear resistant applications and provides good machinability, easy flame hardening and long tool life.

Besides milling proficiency, Fremax 45 also broaches without peeling, and drills and taps clean. Heavy shaping cuts produce no blue chips. The plate surface also grinds to a good finish with only normal grinding wheel wear. In applications such as gears,

ACCURACY is an ECONOMY!
and only precision offers you
HIGHEST QUALITY!

now is the
time
to put your
OLD STEEL
PARALLELS to "LIKE NEW"
conditions and to be ready for the big push.

For the first time Anton Machine Works offers to regrind your old parallels to the following tolerances:

- Parallelism and straightness over length of 6" ±.0001
- Size tolerance between a pair ±.00005. A complete list of new parallels in stock will be mailed on request.

ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 454 on Postpaid Card

174 MODERN MACHINE SHOP

LABOR SAVING Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days.

Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



Write for bulletin 201 today.

**CHUCK DIVISION
THOMAS HOIST CO.**

28 S. HOYNE • CHICAGO 12, ILL.



Jaws locked

For more data circle 455 on Postpaid Card

August, 1961

sprockets, rings, cams, dies, wheels, rolls and machine ways where extra hardness and wear resistance is desirable, Fremax 45 steel can be flame hardened easily.

The introduction of USS Fremax 45 provides a companion grade to U.S. Steel's low carbon Fremax grade which will now be identified as USS Fremax 15. Both USS Fremax 45 and 15 are made by the open hearth process under closely controlled con-

ditions to provide plate steels with excellent machinability, smooth surface finish and a high degree of internal soundness.

For more data circle 74 on Postpaid Card

★ modern machine shop ★

AIR-POWERED SHEAR

Buckeye Tools Corp., P.O. Box 966, Dayton 1, Ohio, has added a sheet metal shear to its line of air-powered,

ALINA SERIES "W" BORE GAGES

Range from .150" to 12"

Alina bore gages are extremely sensitive and designed for trouble-free operation.

The three point centralization system locates the gage in the hole quickly and accurately.

Alina bore gages will swiftly reveal taper, bell mouth, out of round, and other dimensional variations.

A push-button retracts the movable anvil for easy non-scratching insertion into the workpiece. This feature also saves wear on the anvils.

Each gage is equipped with tungsten carbide contact points for lasting on the job accuracy.

Bore gages with measuring depths up to 80" delivered on special order.

Model WO-1 available

with measuring heads down to .150".

Furnished as a set complete with depth adjustment stops (except for sets WO-6, WO-8 and fitted wooden case.



Completely enclosed gage head for greater protection against dust, etc.



WRITE FOR ILLUSTRATED LITERATURE

ALINA CORPORATION

122 East Second Street, Mineola, Long Island, New York

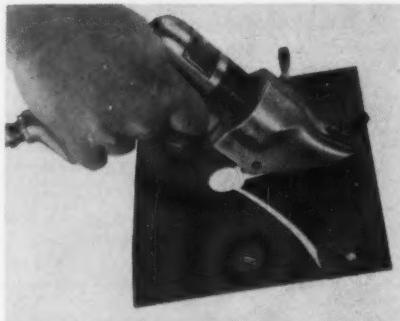
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new equipment . . .

portable tools, combining a versatile cutting head with the efficiency and economy of air motor operation. Cleanly and without distortion, the shear scissors a 7/32 inch path through such materials as 18 gauge mild steel, 1/16 inch laminated plastic, aluminum, tin, Formica and many types of fiberglass.

Cuts may be started from either the edge of the sheet or a 1/4 inch access hole and then continued for any desired pattern of lines or circles up to 2 inch radius. The aluminum shear housing rotates through 360 degrees for convenience in cutting overhead or hard-to-reach areas.

The shear is available in a pistol-grip (21U-103) or straight-type (21U-503) model, both weighing about 2 lb. and measuring about 8 inches long. The pistol-grip model features a 15/16



View shows Buckeye Air-Powered Shear

inch offset, trigger throttle, and a built-in oiler for constant motor lubrication, while the straight-type has a lever throttle and the same offset dimension but requires an external oiler.

Speed is externally regulated by the sensitive throttles on both models. For more data circle 75 on Postpaid Card

The best sheet metal ROLLER LEVELER we've ever built!



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Our brochure gives complete
specifications and data.
Write for your copy TODAY.



WOEHR ROLLER LEVELERS

(in several standard models)
flatten steel, aluminum, brass and
copper in widths up to 60"
. . . in gauges .010 to .125! Your
fabricating capacity and efficiency
are increased *immediately*!
Safe, one-man operation is
simple and accurate.

f.a. **W O E H R** machine co.

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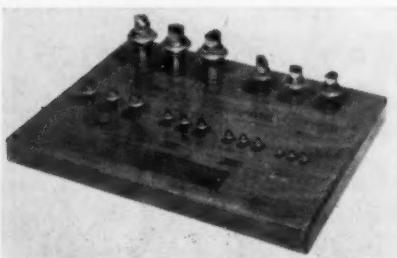
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ADJUSTABLE CARTRIDGE UNITS

The addition of three tool shapes to its standard line of adjustable Microbore Cartridges, the modification of two existing standard shapes, and the expansion of tool styles in the small size cartridge (3/16 inch diameter) have been announced by the Microbore Div., DeVlieg Machine Co., Fair St., Royal Oak, Mich. The three tool shapes are entirely new cartridge styles for chamfering operations when machining with standard adjustable Microbore units. These are now offered in all sizes 1 through 10 (3/16 through 1 inch diameters) and referred to as Styles 24, 54 and 9.

Style 24 is a 45 degree chamfering tool when mounted at the standard Microbore tool angle; Style 54 is a 45 degree chamfering tool when mounted at 90 degrees in a boring bar. In certain applications both styles can be used for boring as well as chamfering. The Style 9 tool is a square end cutting edge cartridge that can be used for chamfering angles other than 45 degrees, when mounted at the required angle, or it can be used as a plunge-facing tool.

Tool shapes modified are the two solid carbide tipped shapes formerly produced as Style 1, for angular mounting; and Style 4 for 90 degree mounting—in the size 1 (3/16 inch diameter) cartridge. These now are



Adjustable Microbore Cartridge Units for machining with carbide cutting tools

August, 1961

**multipurpose
electric furnace
with factory-planned
accessory groups**

THERMOLYNE



**THERMOLYNE
TYPE 2100**

for small parts and short runs . . .
top-loading . . . 6-5/8" dia., 11-1/2"
deep chamber

With choice of six functional accessory groups, this one furnace lets you perform several distinct operations. Accessories make it adaptable as a salt bath, oil bath, melting, vertical muffle, or crucible furnace. Conversion from one operation to another is made quickly, easily, and safely, even when furnace is hot. Compact shape, triple insulation. Operating temperatures to 1650°F continuous, 1900°F intermittent. Automatic or semiautomatic controls available. Price of basic furnace without controls or accessories, \$170. Accessory groups from \$22.75. Write for literature and name of nearest dealer.

THERMOLYNE CORPORATION

(formerly Thermo Electric Mfg. Co.)

488 Huff St., Dubuque, Iowa
For more data circle 458 on Postpaid Card

MODERN MACHINE SHOP 177

new equipment...

designed to use carbide blanks brazed in milled pockets, and identified as Style 2 for angular mounting, and Style 5 for 90 degree mounting. Prior to this modification, Styles 2 and 5 were produced by the company in all sizes, except in the size 1 cartridge.

Through the adoption of the milled pocket cartridge blank, a Style 3 Microbore Cartridge in size 1 is also offered. In machining, this cartridge allows wider facing operations to be performed when angular mounted.

All tools are available in all standard carbide grades, with standard rake angles, in both long and short (A & B) lengths.

For more data circle 76 on Postpaid Card

★ modern machine shop ★

GAGING SYSTEM

Wales Strippit Inc., 207 Buell Rd., Akron, N. Y., has announced the addition of a gaging system for all Model 15A, 10AA and 10A Strippit Fabricators. The gaging system consists of a $1\frac{1}{4}$ inch quick change holder with Microset gaging that allows any operator to make back and end gage settings directly to thousandths in a matter of seconds. The features of the system that allow for such fast and accurate gage settings are dial indicator assemblies and Microbars which are mounted directly to the holder base and the back gage bar. Using only a chart of X and Y coordinates, the operator positions the dial indicator assembly to the nearest inch of the final measurement along the Microbar. Then, by moving either the back gage or the work stops along the end gage into contact with the dial indicator carriage, the operator can read directly to the required thousandth on the face

For more data circle 459 on Postpaid Card

ADJUSTABLE DRILL JIG

- eliminates layout
- cuts drilling time



Used for drilling holes through round stock and hex stock from $\frac{1}{4}$ " to 2" and cap screws from $\frac{1}{4}$ " to $1\frac{1}{4}$ ", the new Mathewson Adjustable Drill Jig eliminates layout and can cut drilling time on small lots to a fraction. And it eliminates the costs of special jigs for larger quantities. • Holes for cotter pins, set screws, drive pins for bayonet joints, oil holes in tubular sections, and wiring holes in cap screws, are all typical of the operations that can be done more economically with this jig. Hole diameters range from .052" to .531", using your A.S.A. standard slip bushings. • The hardened V-block has two 60-degree V's for centering round or hexagonal stock, one for $\frac{1}{4}$ " to $21/32$ " diameter, one for $21/32$ " to 2" diameter. Adjustable stop for locating work longitudinally for drilling any distance from end, may be used on either side. Adjustable bushing carriers hold slip bushings and clamp work securely. • Jig highly successful in permitting use of inexperienced drill operators. For circular write to: Mathewson Machine Works, 40 Hancock St., Quincy 71, Mass.

For more data circle 460 on Postpaid Card

EXTEND YOUR DIE LIFE
Eliminate Scuffing, Metal Pickup, by

CARBIDE COATING

.0005" Thick

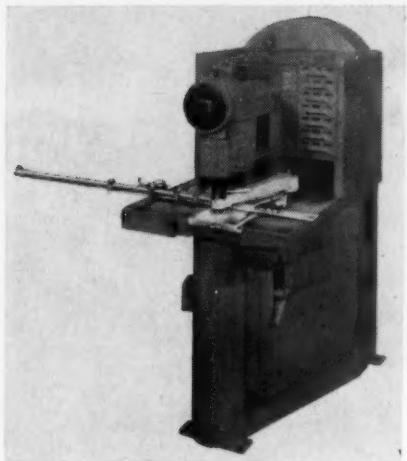
One Day Service

Write for Complete Details

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25205 Ryan Rd. Warren, Mich.
Slocum 7-8262

For more data circle 461 on Postpaid Card



View shows Quick Change Holder with Micro-Set Gaging System for Strippit Fabricators.

of the indicator. Spring loaded indicator carriage and plunger provide

sensitivity and "feel" in gage settings and virtually eliminate any possibility of error, since the least variation is immediately evident on the face of the dial and corrected.

An important feature of the $1\frac{1}{4}$ quick change holder—an integral part of the system—is an indexed guide and die bushing that permits shaped punches and dies to be rotated to any desired degree location in relation to the edge of the work piece. The need for specially keyed holders is said to be eliminated.

For more data circle 77 on Postpaid Card

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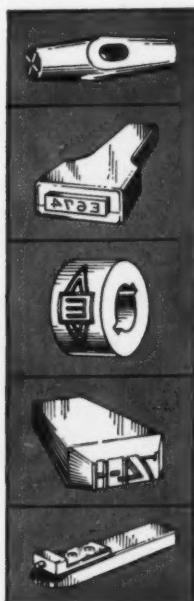
WELDING AND CUTTING OUTFIT

The Harris Calorific Co., 5501 Cass Ave., Cleveland 2, Ohio, has announced a heavy-duty welding and cutting outfit which includes a No. 63-F heavy-duty welding torch. The torch takes up to a size 22 tip (No. 24 drill

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your
mark...**

Whatever your need for product marking may be, Hoggson stamps can meet it. They are made of finest alloy steel, heat-treated to stand continuous impact without breaking face or mushrooming body. Ask about our inspectors' symbol marking hammers, type holders, hand stamps with locating or positioning attachments, marking dies for hand and machine use.

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HOGGSON & PETTIS MFG. CO., New Haven 7, Conn.

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—head rivets from smallest to $\frac{3}{4}$ " diameter cold steel, either by NOISELESS SPINNING or VIBRATING HAMMER method—fast, economically—types include Vertical and Horizontal Spindles, foot-power or automatic.

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THE GRANT MFG. & MACHINE CO.
96 Stillman Ave.

Bridgeport 5, Conn.

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UNIVERSAL DIVIDING HEADS



• Precision built to meet every requirement, Carroll Dividing Heads are the accepted standard in metalworking plants from coast to coast. • A unique optional swivel base makes possible speedy and accurate work settings to compound angles. This and other features convert a conventional Dividing Head into a Universal Work Head or Rotary Table.

Write for 8 page catalog
giving complete details, etc.

Other Models 6" With
or Without Direct Indexing.



10"-12" Universal
Right or Left Hand

Dividing Heads with or without
rect Indexing. Also with Spiral Drive.

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave.

Cincinnati, Ohio

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new equipment . . .



Harris 6325-C Welding and Cutting Outfit

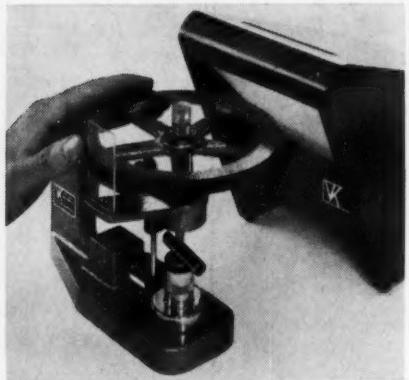
orifice) and has the capacity to handle a wide range of welding jobs. Also, it features high-temperature silicone "O" ring seals that permit fast, easy change of tip assemblies. The head-mix-type cutting attachment will cut up to 6 inches and features rugged triangular tube construction. Its pre-heat valve also serves as a positive oxygen shut off.

Industrial size Model 25 regulators have 5.9 square inch diaphragms to assure accurate control of flame. They have a capacity to weld heavy jobs and to cut up to 12 inches thick. Regulators' soft seat valves close with pressure. Also included in the 6325-C Outfit are extra welding tips, 25 feet of 3/16 inch hose, lighter and goggles. For more data circle 78 on Postpaid Card

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LIGHT WAVE MICROMETER

A light wave micrometer, Model LWM-60, has been announced by The Van Keuren Co., 175 Waltham St.,



Van Keuren Light Wave Micrometer

Watertown, Mass. The light wave micrometer is a precise measuring instrument which reads directly on the handwheel to 0.00010 inch and on the vernier to 0.00001 inch. It has a capacity of 0 to 2 inches and is simple to

use. An unskilled operator can easily learn to duplicate readings with maximum accuracy.

Designed as an inspection standard, the instrument measures basic standards, plug gages, measuring wires and setting blocks. It checks roundness of cylindrical shapes and measures pitch diameter of threads and gears.

For more data circle 79 on Postpaid Card

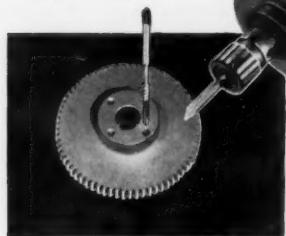
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PLUG GAGE SET

K & K Grinding Co., K & K Gage Div., 230 Richardson St., Brooklyn 22, N. Y., is now marketing a precision plug gage set containing 20 reversible wire type plug gages. According to the manufacturers, one set of plug gages will inspect the four most used hole sizes: namely 1/16, 1/8, 3/16 and 1/4 inch.

The K & K Precision Plug Gage Set includes four handles of the A.G.D.

COMMANDER TAPPER handles “IMPOSSIBLE” tapping job



WRITE FOR PRODUCTION
TOOL CATALOG TODAY!

THE JOB: Tap 4 6-32 holes 11/16" deep in the hubs of production run, heat treated gears.

THE PROBLEM: Excessive breakage of the specially relieved taps used to handle the unusual depth-to-diameter tapping job . . . spoiled parts . . . high costs. A number of different tappers were tried, but the problem remained.

THE SOLUTION: A Commander Tapper was installed . . . adjustable torque control set to protect the tap and job was resumed.

THE RESULT: 1700 pieces were tapped without breaking a single tap. Tolerances were held and a very high rate of production was maintained. This is typical of the performance a Commander Tapper can produce.

The extreme sensitivity, and wide range of adaptability of a Commander Tapper can be put to work for you; ask your nearby Commander Distributor for a demonstration.

Commander MFG. CO.

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Formulas
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ADDISON *QUALITY* ILLINOIS

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Introducing NEW series



15" ROTARY
TABLE—STD.

ROTARY TABLES 5-8-12-15-18-24" sizes both standard and dial indexing types
ADJUSTABLE TILTING TABLES #0-1-2
COMPOUND TABLES #1-1½-2
ROTARY-COMPOUND TABLES #1-1½-2
INDEX CENTERS—multiple spindle
SPECIAL MACHINES—designed and built

See your dealer or write for bulletins

The John B. Stevens Company

Main Street, Somersville, Conn., U. S. A.

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new equipment . . .



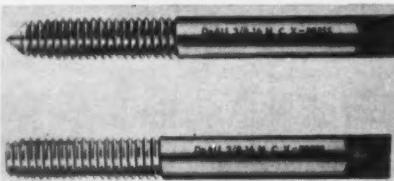
K & K Plug Gage Set contains 20 reversible wire type plug gages and 4 handles.

type complete with collet, and is furnished in an attractive hardwood box with markings identifying each individual plug size. Claimed to have a guaranteed accuracy to 50 millionths of an inch, each gage is made of high speed steel, hardened to Rockwell C62-64 and with fine micro-inch finish. Each gage is a full 1.875 inches long. For more data circle 80 on Postpaid Card

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TAPS

X-Press Taps, which introduce a new concept in tapping by forging internal threads in copper, brass, zinc, lead, aluminum, die castings and other ductile materials, have been introduced by The DoAll Company, Des



View shows DoAll X-Press Taps (Above) Plug Series and (Below) Bottoming Series

Plaines, Ill. The taps have long life and run at high speeds. They are said to produce strong and accurate threads and eliminate chip problems.

Standard sizes range from No. 0-80 through $\frac{1}{2}$ inch diameter, N.C. and N.F. threads, in plug and bottoming chamfers.

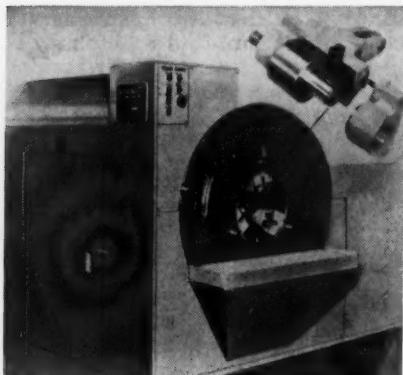
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DIE THREAD ROLLING MACHINES

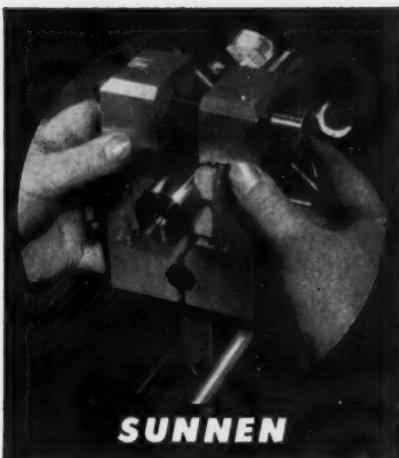
Design changes have been made in both of the heavy duty Models A33A and A34A three cylindrical die thread and form rolling machines marketed by Reed Rolled Thread Die Co., Holden, Mass. These changes have added to the versatility of the machines as well as reducing the setup and change-over time required.

The Reed three cylindrical die thru-feed principle of rolling is now possible in the A33A machine using dies set at either parallel or skewed axis. Feeding of the work with parallel axis dies (dies positioned parallel to axis of work, 0 degree skew) is accomplished by using a greater lead angle on the dies than that of the thread or form to be rolled. With skewed axis rolling, the axes of the dies are skewed be-



View of Reed Die Thread Rolling Machine

August, 1961



SUNNEN

EXTERNAL HONES

SAVE MANY HOURS IN YOUR
TOOL ROOM OR MACHINE SHOP

They produce exact size, mating fit or surface finish on O.D.'s of... plug gages, shafts, arbors, spindles, pistons, plungers, leader pins, ejector pins... many others.

Guaranteed to produce geometric accuracy to "split-tenths" with surface finish as low as 2 micro-inches.

They correct all errors such as waviness, centerless grind chatter, bow and taper. Invaluable in production, job lot or tool room work.

They combine speed of honing with precision of lapping. Parts to be honed can be driven by lathe or Sunnen Honing Machine.

Available in 4 sets:

$\frac{1}{8}$ " - $13/32$ ", $13/32$ " - $13/16$ ",
 $13/16$ " - $1\frac{1}{2}$ ", $1\frac{1}{2}$ " - $2\frac{3}{4}$ " diameters.

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EXTERNAL HONES
can help you.

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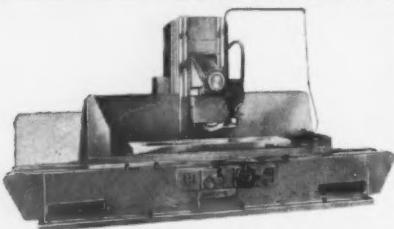
7924 Manchester Ave. • St. Louis 17, Mo.
Canadian Factory Chatham, Ontario

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MODERN MACHINE SHOP 183

FOR

MAXIMUM PRECISION IN TOOLROOM OR PRODUCTION GRINDING



MODEL F HYDRAULIC FEED SURFACE GRINDER a production type with cross sliding head, built in sizes ranging from 12" x 18" x 48" to 30" x 25" x 120". Heavy, powerful grinder with maximum table speed of 150' per minute. Motor mounted directly on grinding wheel spindle to assure full power is transmitted directly to wheel. Automatic feeds in increments from .0001" to .001" per reversal available.

NO. 360 HYDRAULIC FEED SURFACE GRINDER. A precision toolroom type which offers absolute accuracy with microinch finish at production speeds. One-piece column and base, infinite longitudinal table speeds from 3" to 120" per minute, variable speed cross feed. Available with new automatic downfeed with automatic spark-out after preset stock removal.



NO. 10 UNIVERSAL CUTTER AND TOOL GRINDER built to meet the need for a high grade machine of medium capacity at a moderate price. Combines rigidity with maximum convenience of operation. Head swivels 360°, locks in any setting; table swivels 90°. Hand operated longitudinal movement. Two spindle speeds.

new equipment . . .

tween 0 and 5 degrees to provide for the feeding of the work.

The Model A33A machine is equipped with die holders designed to accommodate a 4 inch width of die and permits the most economical selection of die face for thru-feed rolling. Although the A33A machine can be equipped for in-feed rolling, it is the machine usually selected where all of the work is to be thru-feed or as a combination machine when there is a limited requirement for in-feed rolling on work with thread and form lengths under 4 inches. The A33A machine is now equipped with a 40 h.p. motor and the gear box has been redesigned to accommodate continuous thru-feed rolling of thread and form diameters from $\frac{5}{8}$ inch to 2 $\frac{1}{2}$ inches. Diameter capacity of the machine when used for in-feed rolling is $\frac{3}{4}$ inch to 2 $\frac{1}{2}$ inches. Heavy duty 1 $\frac{1}{8}$ and 2 $\frac{1}{2}$ inch diameter spindle assemblies cover the full capacity range of the machine.

The Model A34A machine is equipped with die holders designed to accommodate 5 inch wide dies. This machine is also equipped with a 40 h.p. motor and is selected for heavy duty in-feed rolling, although it too can be offered as a combination machine where thru-feed rolling may be required in addition to in-feed rolling. The in-feed capacity of the A34A machine provides for rolling thread and form diameters from $\frac{3}{4}$ inch to 4 inches and lengths up to 4 $\frac{1}{2}$ inches. The diameter capacity for thru-feed rolling is $\frac{3}{4}$ inch to 2 $\frac{1}{2}$ inches.

Die holders for both the A33A and A34A machines have been completely

GRAND RAPIDS

For more data circle 469 on Postpaid Card

redesigned. They now include removable front bearing supports. This allows changing or replacing the dies without removing the die holders.
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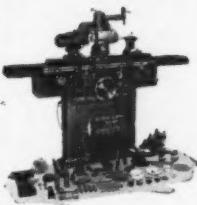
"BUILDING-BLOCK" UNITS

The Standard Electrical Tool Co., 2487 River Road, Cincinnati 4, Ohio, has announced a new group of "Building-Block" Units in producing machinery or for converting existing machines into new individually designed units. In the accompanying illustrations, Fig. 1 illustrates a ball bushing slide available for hand movement or equipped with power feed. Fig. 2 is a typical "Building-Block" Assembly around which an automotive-type of machine was developed. The feed parallel with the 3 h.p. 3600 r.p.m. super precision spindle is assembled with a right angle micrometer dial handwheel feed. Any position as required for the grinding wheel on a 360 degree circle is instantly accomplished through the graduated swivel base mounted on a heavy duty feed base.

Conversions of existing machines for use with Standard's Electrolytic Spindles frequently must include a controlled work feed table by installing a compound table or feed base as illustrated by Fig. 3. Although the illustration is of an 18 inch longitudinal travel powered by a variable speed 0 to 220 r.p.m. motorized transmission drive, various increments of power travel are available up to 50 inches. The micrometer dial cross feed is available with the length of movement as required. Power feeds have non-metallic ways, gravity oil lubrication, and typical of

YOU CAN FIND THE RIGHT MACHINE FOR YOUR NEEDS ON THESE PAGES

NO. 60 UNIVERSAL CUTTER AND TOOL GRINDER offers precision sharpening, fast set-ups and low maintenance. Designed for maximum convenience of operation, with work weight carried directly over base, permitting operator to stand close to work. Master hand wheel provides three speeds of longitudinal table travel.



NO. 20 HAND FEED SURFACE GRINDER has hand wheels for vertical and longitudinal table movement to assure toolroom precision and exceptionally fine finish. One-piece column and base, greased-for-life ball bearing spindle. Available with portable, motor driven coolant system.



NO. 1230 HYDRAULIC FEED O. D. & I. D. GRINDER meets the needs of users requiring a machine that does both internal and cylindrical grinding. It is a rugged, precision tool capable of taking rough cuts as well as producing the finest finish. Has a host of controls and adjustments for maximum convenience and versatility of operation.

A note on your letterhead will bring full details. Please specify the type of grinder you are most interested in.

GALLMEYER & LIVINGSTON CO.
408 Straight Ave., S. W., Grand Rapids, Mich.

GRINDERS

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August, 1961

MODERN MACHINE SHOP 185



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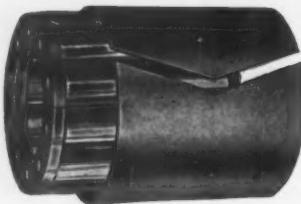
Ottemiller

CAP SCREWS
SET SCREWS
MILLED STUDS

CUSTOM
SCREW MACHINE
SPECIALTIES

**Wm H. Ottemiller Co.*
YORK, PENNSYLVANIA

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STANDARD SIZES ARE SHOWN IN OUR
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SPECIAL SIZES TO ORDER.

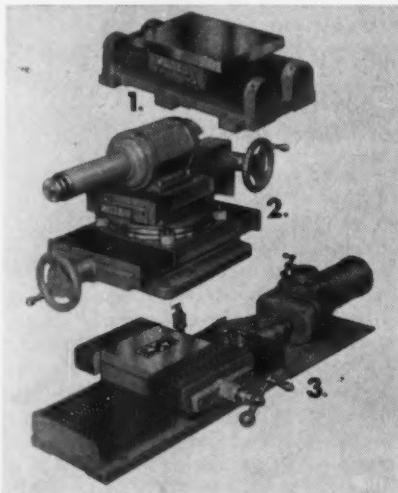
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Incorporated 1912

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new equipment . . .



(1) Ball Bushing Slide, (2) Building Block Assembly and (3) Controlled Work Feed Table.

all units, as illustrated, accordion way protectors are an available accessory.

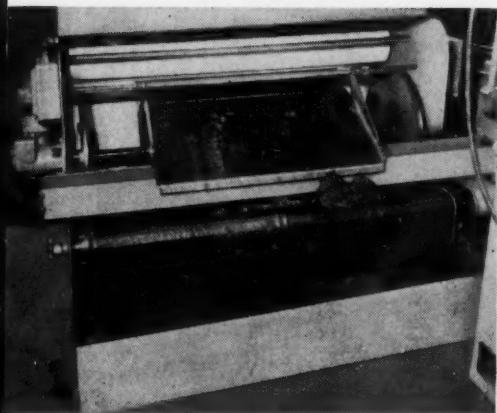
Assemblies as illustrated may be ordered for mounting in any plane or at any required angle. Other accessories include feed lock, taper gib, ratchet wrench, feed adjustment, hydraulic power traverse with rapid and controlled feeds, cycling equipment, and other accessories.

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FILTRATION UNIT

Barnes Drill Co., 860 Chestnut St., Rockford, Ill., is marketing a filtration unit that effectively removes all types of contaminant from coolants with a wide range of viscosities. The Barnes-driL Kleenall Filtration Units, in five models with capacities from $\frac{1}{2}$ to 60 g.p.m., perform "two stage" coolant cleaning. In the first stage, dirty coolant flows through a powerful magnetic



Barnesdril Model MP 25 Kleenall Filtration Unit on a Thompson True-Forming Grinder

field that removes ferrous particles. In the second stage, the coolant passes through a filter medium which removes the non-ferrous contaminants. The filter material is specially selected for its porosity which, in turn, depends upon job conditions.

As coolant passes through the fabric filter, a seal wheel positively keeps dirty coolant from over-flowing at the sides of the fabric. Flow of coolant through the float wash coupling removes any swarf that may accumulate on the float. The Barnesdril Kleenall Combination Magnetic Separator and Fabric Filter is designed to meet the highest standards of machine tool design.

For more data circle 84 on Postpaid Card

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SLIP OR CARTRIDGE-TYPE SPINDLES

Zagar, Incorporated, 23898 Lakeland Blvd., Cleveland 23, Ohio, has introduced slip or cartridge-type spindles which are now offered on Zagar multiple spindle gearless heads for drilling, reaming and tapping. The slip-spindle drill is driven by the standard

DRESS ABRASIVE BELTS FOR 30% LONGER LIFE



Unique Desmond Beltbrasive® dressers increase abrasive belt life 30% or more . . . give you "new" surface efficiency throughout belt life. Patented dresser quickly cleans out loaded belts, drums or discs on metal, wood or plastic jobs. One light pass when belt begins to load is all you need. Typical model costs less than \$7. Ask your Desmond distributor.

The only complete line of grinding wheel dressers and cutters

Desmond

**The Desmond-Stephan Mfg. Co.
Urbana, Ohio**

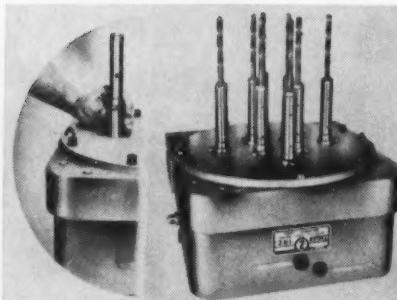
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MODERN MACHINE SHOP 187

new equipment . . .

Zagar method of gearless spindle drive. The plate into which the spindles are inserted is pre-bored to accept spindles in varying patterns. Consequently, it is simple to insert and remove spindles but retain the rigidity and accuracy of fixed center drilling.

The absence of gears and joints permits a comparatively reduced overall



View of Zagar Slip or Cartridge-Type Spindles

JIG GRINDING and JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAINSIDE, N. J.

Telephone: ADams 2-7300 Digby 9-1445, N.Y.C.

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NEW INTERAPID

SWISS TEST INDICATORS

- Precise repetition
- Non magnetic
- Light measuring pressure
- Carbide contact point
- Stem & Dovetail adaptation

—Dealer inquiries invited—

BOREL & DUNNER, INC.

19313 Farmington Rd., Livonia, Mich.

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height of the head, enhancing its adaptability. A minimum of spindle extension is required, thus making an overall height of 7½ inches possible in the smallest head size. Four standard head sizes cover maximum bolt circle areas of 6½, 10½, 12½ and 15½ inches. Spindle sizes are 1¼ inches and 1½ inches, with capacity up to 9/16 inch in steel. The standard heads are mounted on round or flange-type quill machines.

For more data circle 85 on Postpaid Card

★ modern machine shop ★

SPRING PLUNGERS

Vlier Engineering Corp., 8900 Santa Monica Blvd., Los Angeles 46, Calif., has announced that all models and sizes of Vlier Spring Plungers are available with the "Nylok" self-locking feature at no extra cost. Vlier Spring Plungers are simple, spring-loaded



**DYKEM
STEEL BLUE**

Stops Losses

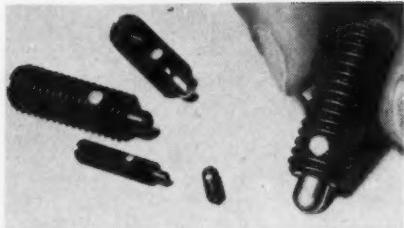
**making Dies and
Templates**

Popular package
8-oz can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2201F North 11th St. • St. Louis 6, Mo.

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Vlier Spring Plungers with "Nylok" features

devices which provide accurate, constant end pressures. They are widely used to position parts in dies, jigs, and fixtures, and in original equipment applications where controlled end pressures are required.

Four nose types are available: Standard (round nose); Hex Nose, for greater ease of installation; Silvernose, which indicates special springs for use in highly repetitive die applications, and Plastic Nose, for use with soft

materials such as brass and aluminum. Standard sizes vary from No. 6-32 by 17/32 inch to 1 inch—8 by 2 1/4 inches. End pressures range from 1.5 to 68 lb. All models can still be ordered without the "Nylok" feature, if desired. For more data circle 86 on Postpaid Card

★ modern machine shop ★

CARBIDE CUTTERS FOR TAPE-CONTROLLED MILLS

A series of "Helicarb" shank and shell end mills for Milwaukee-matic and other tape-controlled milling machines has been announced by Sonnet Tool & Manufacturing Co., 580 North Prairie Ave., Hawthorne, Calif. The cutters have inserted helical carbide blades, the backs of which are serrated to interlock with matching serrations on the body of the cutters. This feature permits the blades to be preset in the toolroom and a constant cutting

BEVERLY Electric THROATLESS SHEAR

Cuts Any Shape in Metal
Easily, at High Speed

Provides 1725 cutting strokes per minute . . . correct speed to handle cutting, trimming and slitting operations in any metal to shear's capacity. Unique downward-forward shearing action provides faster, cleaner cutting; insures longer blade life. Operator's hands are free to feed and guide work through shear—permits accurate cutting to a line or template. Throatless design allows sheet to be turned in any direction during cut. Motor operates on 110V., 60 cycles, AC.



Complete with base and supporting column to provide most efficient and comfortable working height from floor. Can be used with base only as bench shear.

See your nearby Beverly Distributor for a demonstration or write today for illustrated circular.

BEVERLY SHEAR MANUFACTURING CORP. 3000 W. 111th St. Chicago 55, Ill.

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August, 1961

MODERN MACHINE SHOP 189

new equipment . . .

diameter, as demanded by the tape program, to be easily maintained. When the blades are resharpened, they are simply moved outwardly one serration. This eliminates having to cut a new tape for the machine.

All the inherent advantages of helical carbide are incorporated into these

IMMEDIATE DELIVERY!

KNOBS LEVERS

WHEELS & HANDLES



Cadmium plated, large selection of styles and sizes. Specials on request. Send for FREE catalog.

MACHINE PRODUCTS Corporation

6771 E. MINICHOLS ROAD, DETROIT 13, MICHIGAN

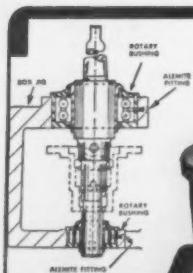
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**INDEXING UNITS**

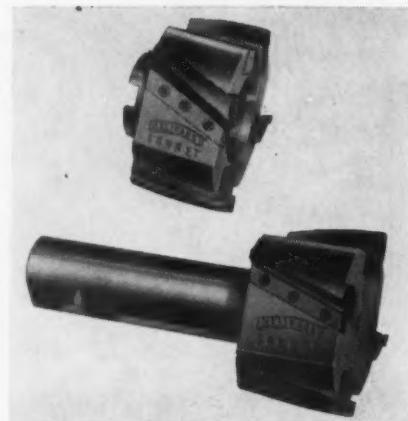
**High Accuracy
Low Price**

ELISHA PENNIMAN • ELMWOOD 10, CONN.

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**SEALED**

PRECISION
BALL BEARING
CONSTRUCTION



Carbide Cutters for tape controlled mills

cutters. The included cutting angle remains constant over the full length of the cutting edge, distributing the cutting load uniformly. This shearing cutting action greatly reduces impact, chatter and crumbling of the cutting edge.

The cutters are available in sizes from 1½ inches in diameter and larger, for cutting aluminum, brass, bronze, cast iron, steel and stainless steel.

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★ modern machine shop ★

TAP EXTRACTORS

A series of 22 tap extractors has been announced by The Walton

ROTARY BUSHINGS**FOR DRILLING, CORE DRILLING
ROUGH AND FINISHED BORING**

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work - or both.

Eliminates expensive tool construction - Reduces tool wear - Prevents seizure and pilot breakage - Especially adapted where precision is required.

Write for full information and prices

ROTARY BUSHINGS

42336 ANN ARBOR ROAD PLYMOUTH, MICH.

Telephone Glenview 3-2295

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View shows Tap Extractor designed for Helical Coil Wire Screw Thread Inserts.

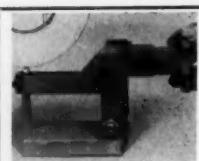
Co., P. O. Box 5, Elmwood Branch, Hartford 10, Conn. These are designed to fit all standard Helical Coil "S.T.I." taps from size No. 4 through $\frac{1}{8}$ inch, of 2-fluted, 3-fluted, and 4-fluted styles. For more data circle 88 on Postpaid Card

★ modern machine shop ★

BEND ANGLE SELECTOR PROGRAMS BENDING

The Dial-A-Bend, an electronic angle-of-bend selector, has been announced by Pines Engineering Co., Inc., 644 Walnut, Aurora, Ill. Even an untrained operator is said to be able to program bend angles from blueprint specifications or records from previous setups. Correction factors including springback are accommodated by setting compensator dials. Then each bend angle is "dialed" in the normal progressive sequence on the individual angle dials in the panel. Up to 10 different angles can be programmed on Pines Rotary Bending Machines and up to 15 on bending presses.

Dial-A-Bend operates on the principle of matching electrical impulses from signal potentiometers which are easily and quickly set to produce the



**Low Price—\$149.50
Includes Diamond**

**Write today for free illustrated folder.
SOMERSET TOOL CO.**

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August, 1961

NEW 1961 MODEL "SS" RADIUS DRESSER
Newly engineered and redesigned after 19 years of field testing. Convex, concave, or complex combination shapes are dressed quickly and easily by even inexperienced operators. Accuracy to .0002". Dresses all wheels up to 12" diameter.

320 Virginia St.
Hillside, N. J.

required degree of bend. When the swinging arm rotates to the proper angle, the control matches the angle dial setting and the bending arm is stopped, terminating the bend. Each angle dial is equipped with a 3 digit micro-dial graduated to tenths of a degree to provide maximum precision in bend angle settings.

Two compensator dials in the panel provide for "dialing" the necessary overbend to allow for springback and

Mold your own LEAD HAMMERS

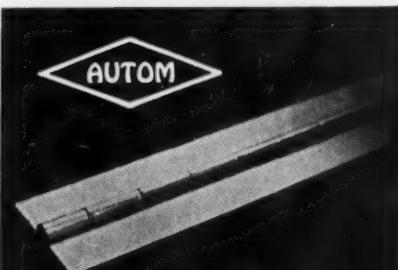
Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it". Simple to operate



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CONTINUOUS HINGES

SPECIFICATIONS

Open width $\frac{3}{4}$ " to 12"
Gage Material .040 to .187"
Pin Diameter .093" to $\frac{1}{2}$ "
Lengths to 144"

AUTO MOULDING & MFG. CO.

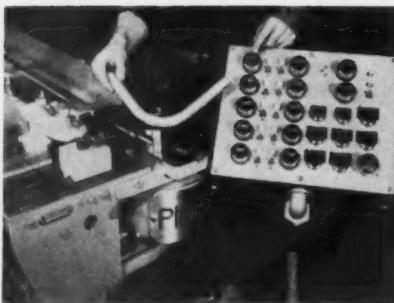
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1114 E. 87TH ST. • CHICAGO 19**

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MODERN MACHINE SHOP 191

new equipment . . .

other factors influencing the bend angle. One dial applies a constant degree of overbend to all preset angles. The second adds a percentage of overbend to each angle to insure workpiece accuracy. Each of the angle dials is arranged with an "off-on" toggle switch and indicator light. The switch must be in the "on" position in order



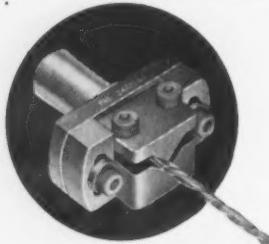
Pines Dial-A-Bend Bend Angle Selector

CARBIDE CONTACT POINTS

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in half the time

Brookfield Tool Holders make tool set ups easy!

Now, without bushings or collets, on the first try you can set up drills, counterbores, reamers or cutters for almost any machining operation. Precision ground V-jaw vises, Brookfield Tool Holders make even toughest set-ups a cinch. With one wrench, insert the tool, tighten the jaw, then float the tool into dead center position and tighten. It's as easy as that!

FREE! Descriptive illustrated brochure, plus price and specification lists.

BROOKFIELD, INCORPORATED

STOUGHTON 111, MASSACHUSETTS

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192 MODERN MACHINE SHOP

to include the bend in the sequence. This permits advance programming of more than one job by switching on only the desired dials for the specific sequence.

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★ modern machine shop ★

MINIATURE END MILLS

A line of precision ground, miniature, high speed steel end mills has been introduced by the Brown & Sharpe Manufacturing Co., Providence, R. I. All of these end mills have 2 or 4 flutes and 3/16 inch shanks. The B&S miniature end mills called "Thriftmite" are recommended by the company for plunge cutting, slotting, contour cutting, profiling and general purpose end milling on virtually all materials.

The "Thriftmite" is efficient for

CENTERLESS GRINDING

Straight cylindrical, shoulder, profile and multiple diameter, internal and surface grinding of any material. Precision ground taper pins and straight dowel pins. Brown & Sharpe and Swiss Automatic aircraft and standard screw machine parts, heat treated and ground, if necessary. Light bench type production drilling. Prompt service. Send prints for estimates.

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PORTER MACHINE CO., INC.
Mfgs. of Por-Matic air operated drilling fixture.
Drill bushings for same in stock.
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August, 1961



Brown & Sharpe Thriftmite Miniature End Mills

slotting or router-type cutting of fiber sheets, laminates and other thin synthetics or alloys used in electronics and circuit board work. All "Thriftmite" end mills are precision ground with 40 degree helical flute.

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CUT-OFF SAW

Promacut Uni-11A Multi-Purpose Cut-Off Saw, being marketed by Production Machinery, Inc., 4941 West Belmont Ave., Chicago 41, Ill., is designed with versatility for random cutting in fabricating shops or repeat operation for high volume production without clamping or cooling. The saw cuts all shapes of carbon and stainless steel, and many of the new alloys, employing the basic Promacutting principle which depends upon a unique tooth shape in an alloy steel circular saw. This produces a semi-milling action. Speed of rotation and high torque of the 10 h.p. motor moves the blade through stock so fast that heat is not absorbed. The result is an almost burr-free cut with no blueing of the metal. The approach of the saw to the stock holds work in position.

An open table surface provides a 27 inch clearance between blade and column and accommodates up to 16 inch

widths of long stock for through-cutting. The spring-loaded, counterbalanced head adjusts with movement of only one locking lever so that proper approach to work is obtained in a matter of seconds.

Cutting times for Promacut Uni-11A range from 11 seconds for through-cut on 12 inch 16.5 pound I-beam down to 1 second or less on 2 by 2 by $\frac{1}{4}$ inch angle or 2 inches by $\frac{1}{4}$ inch flat bar. Up to 4,000 cuts are made before the

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with the

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RADIAL



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F.O.B. Detroit
2 H.P.
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and name of nearest dealer for demonstration.

Mfrs. of the VEETMATIC Precision Drilling
Machine with Numerical Control and the
VEET SPEEDMILLER for Planer Conversion.

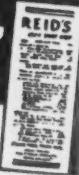
MADE BY *Veet* INDUSTRIES EAST DETROIT, MICH.
Tel. FERIAZON 8-1500

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It's Free!

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are true to rim. Handles
and rims are polished to
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Made straight or dished in
both solid web or spoked
counter balanced types.
Fine grain cast iron. Center



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1/8" to 2 1/2" dia.

**90° to 140° included
angle with**

Variable Clearance

NO CHUCKS

NO COLLETS

**True Conical
Relief for FAST CUTTING**

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Positive setting for included angle and
clearance angle plus accurate centering
produce the right point for every material.
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"DV" TODAY.

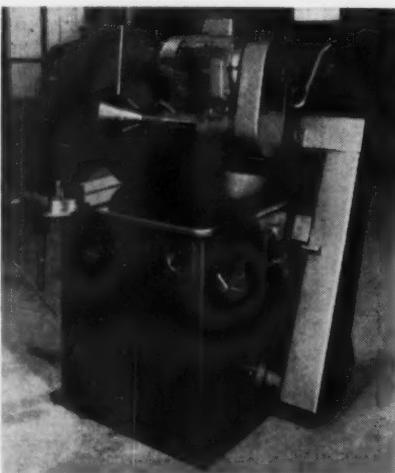
McDONOUGH MFG. CO.

1521 Galloway, Eau Claire, Wisconsin

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194 MODERN MACHINE SHOP

new equipment . . .



Promacut Uni-11A Multi-Purpose Cut-Off Saw

blade requires resharpening. Other typical cutting times are: 9 seconds on 12 inch 20.7 pound channel, 3 seconds on 1 inch round bars, and 2 seconds on 4 inch o.d. $\frac{1}{8}$ inch wall tubing.

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GAGE BLOCKS

The Webber Gage Co., 12899 Triskett Rd., Cleveland 11, Ohio, has announced the development and production of two series of its Croblox (solid chrome carbide) gage blocks. One series known as "Thin" blocks has been planned to meet the specific needs of the many manufacturers who produce miniature precision parts. The 28 Croblox "Thin" set includes blocks ranging from 0.010 inch to 0.090 inch in A+, AA and Laboratory Master accuracies.

Another Croblox series includes two sets, one of 11 and another of 21, and is available in five millionths and ten

August, 1961



View of Webber Croblox "Thin Block" Set

millionths steps, in Laboratory Master grade. All blocks are rectangular style. Individual Croblox blocks are available from these sets in sizes ranging from 0.100 inch to 0.100005 inch, and 0.1000010 inch and so on through

0.1001 inch in Laboratory Master grade. A notable feature of the 21 and 11 block sets is that the linearity of the scale on electronic comparators or other instruments can be checked in five millionths or ten millionths steps to an accuracy of less than one millionth of an inch.

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FLUORESCENT WORK LIGHT

A magnetic-base fluorescent work light has been announced by Stocker & Yale, Inc., 250 Green St., Marblehead, Mass., which mounts directly on machine tools or other equipment where a concentrated work light is needed. The Model No. 16-7M Jacklite has a powerful magnetic base which secures it to equipment without bolts or screws. It can be instantaneously mounted to deliver cool, clear, shadowless lighting for maximum visibility. Its compact size saves

INTERNAL CUTTING TOOLS

4 DISTINCTIVE STYLES
IN CARBIDE & HSS
SIZES FROM $\frac{1}{16}$ " UPWARD

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BORING FACING

THREADING RECESSING

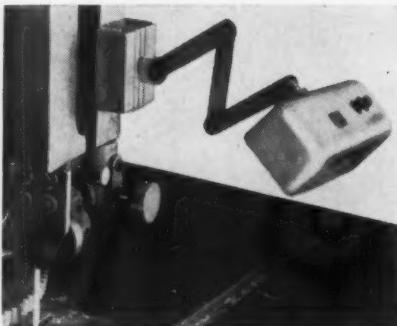
SOLID SHANK TYPE

DETACHABLE HEAD TYPE

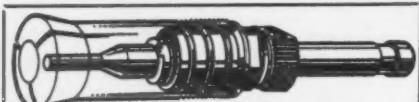
new equipment . . .

space; permits greater freedom of position and movement. It can be adjusted to any angle and the head rotated 330 degrees to direct light exactly where it's required.

The magnetic-base Jacklite has a pair of 4-watt miniature fluorescent tubes which deliver up to 500 foot candles of cool, white light. The tubes



Stocker & Yale Magnetic-Base Jacklite



NEW! Self-Centering SC Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 days Free Trial. Several Territories Open for Distributors.

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are held firmly in place by Stocker & Yale turrets. Jacklite is ruggedly constructed for industrial use. It will withstand severe shop conditions. The three-link jackknife arm has four double-shear precision pivots, self-compensating for wear. Jacklite is also available with a heavy cast base for bench work.

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★ modern machine shop ★

MILLING UNIT

Veet Industries, 25753 Groesbeck Hwy., East Detroit, Mich., has developed a Veet 10-Speed Speedmiller for high metal removal rate carbide milling on planers. With 30 to 40 h.p. applied directly to the cutter spindle, the compact power unit removes metal at a rate well above 2 to 3 cubic inches per minute per horsepower. With a



SPELLMACO "SPOTTERS"

**A matched set of transfer punches
for toolmakers, machinists and tool cribs**

Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

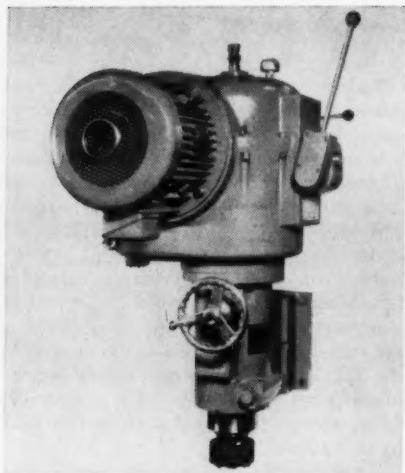
Precision made of finest tool steel—Carefully heat treated and tempered for
long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes $\frac{1}{32}$ " to $\frac{1}{2}$ ", by
 $\frac{1}{64}$ "—plus handy $1\frac{1}{2}$ " size. Length $4\frac{1}{4}$ ". ONLY \$19.40.

Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

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View shows Veet 10-Speed Speedmiller

selection of 10 speeds instantly available by single-lever shift from 37 r.p.m. to 900 r.p.m., the Speedmiller can rapidly mill any material from cast iron to stainless steel.

All gears are high-tensile forgings with helical crown-shaved teeth, heat-treated and carried on anti-friction bearings. All gears are in constant mesh, and only clutches are shifted to change speeds. To achieve low overhung weight, particularly essential for planer conversions, transmission housings are high-tensile aluminum alloy, with the spindle center line only 5½ inches from the rail-plate mounting face. The motor weight is halved by doubling the speed, then reducing it in the high-torque transmission. Micro-adjustment of the cutter height is done without raising and lowering of the massive motor and ram.

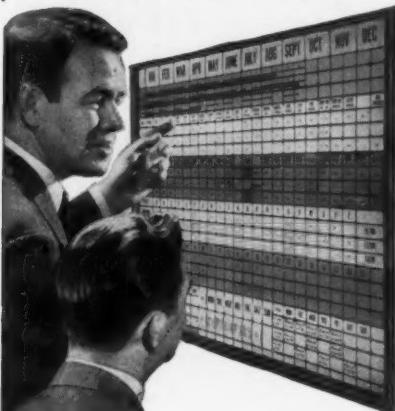
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The 14 inch screen optical comparator and measuring machine

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Model 2600
Contour Saw



Model 610
Carbon Blade Band Saw

TWO NEW PEERLESS SAWS

● The Model 2600 includes all the engineering know-how gained by almost a half century of Peerless experience in the metal sawing industry . . . throat capacity 26", height 15", adjustable table.

The Model 610 brings new versatility to your shop . . . completely mobile . . . capacity 6" x 10" . . . adjustable vise, saw guides and pressure control . . . ideal for general maintenance work.



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PEERLESS MACHINE CO.

Oshkosh, Wisconsin

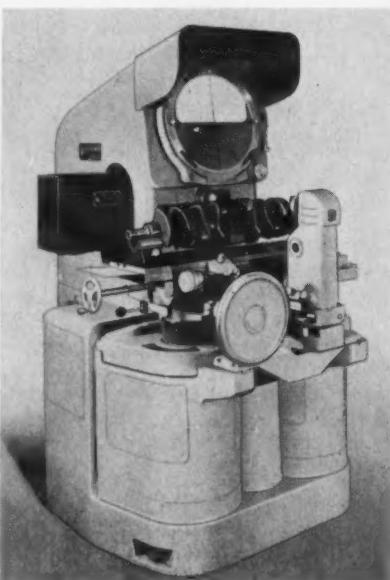
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198 MODERN MACHINE SHOP

new equipment . . .

(Model FC-14ER) introduced by Jones & Lamson Machine Co., Springfield, Vt., is particularly applicable to the inspection of such parts as lead screws, die bodies, castings and forgings, large circuit boards, and so on. The work table of the FC-14ER is 32 inches long, 8 inches wide and is supported on two heavy duty columns having 10 pitch hardened and ground lead screws. This rugged double spindle construction provides extra stability for motion of large heavy workpieces, both laterally and vertically. Measurement to great accuracy is said to be assured.

The machine is equipped with the Jones & Lamson Telecentric Optical System which provides projection lenses that are matched and preset for exact rated magnification on master optical benches. No adjustments are



Model FC-14ER 14 Inch Optical Comparator

August, 1961

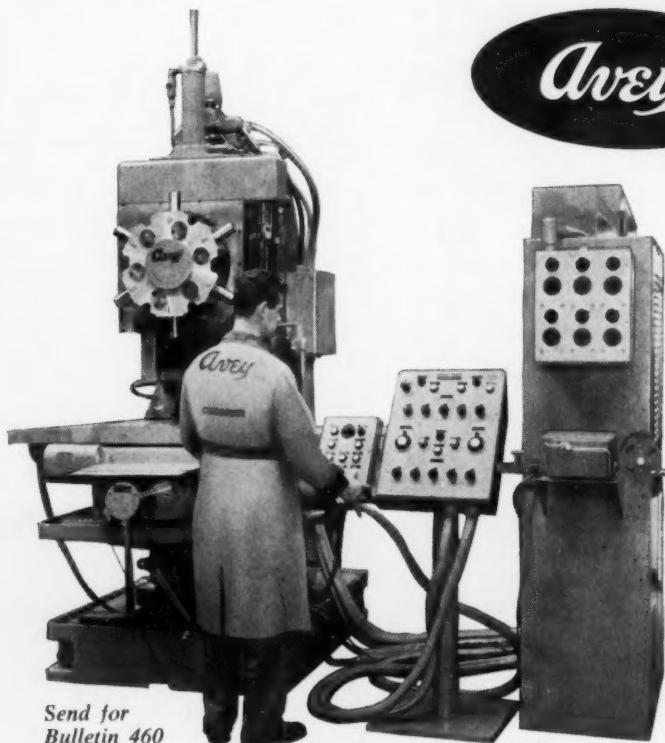
necessary when changing magnifications. Features available with this model include: electronic variable speed power elevation; variable light intensity control; six-position automatic indexing lens selector; normal reflection unit; tracing attachment and vertical illumination and staging equipment.

For more data circle 95 on Postpaid Card

MACHINE PRODUCES FORMED STAMPINGS

U. S. Tool Co., Inc., 225 North 18th St., Ampere (E. Orange) N. J., has introduced the U. S. Model MS-28-HS Multi-Slide designed to reduce the piece part cost of formed stampings. The machine is said to have an output

6 precision spindles by

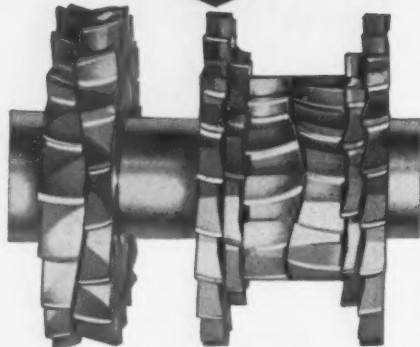


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Bulletin 460*

You can get this rugged Avey 250 Turret-Dex with either automatic or numerical controls. Rotary, 2- or 3-axis positioning. Pre-selected speeds, feeds, rapid advance, tapping cycles. Automatic depth control all spindles; automatic turret clamp; positive spindle stop; skip index. Capacity to 1 1/4". Eight spindles optional. Avey, Box 1264, Cincinnati 1, Ohio.

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ABER
Curved Tooth
**MULTIPLE
CUTTERS**



By using the wide range of Standard ABER CUTTERS for gang milling . . . fast accurate cuts on any number of surfaces simultaneously.

ABER Engineering service will design and make the unit exactly suited to your job . . . send blueprints and specify material to be cut.

ABER Curved Tooth PLUS FEATURES

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- 2. More accurate control of limits and finish
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 24 page catalog
 on milling with
 ABER Cutters.



ABER ENGINEERING WORKS

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200 MODERN MACHINE SHOP

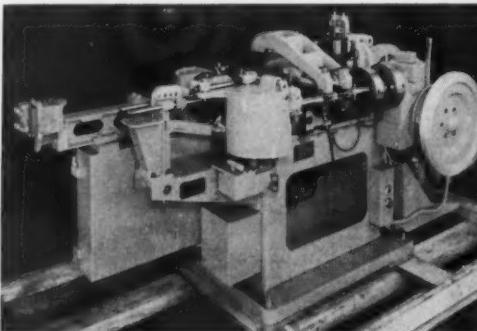
new equipment . . .

of 400 strokes per minute. The die heads are reversible and can be used from either front or back, giving the advantages of versatility both in operation and in the designing of tools. The MS-28-HS is equipped with specially constructed forming slides and a newly developed high speed, positive grip type feed.

The die sets are furnished complete with hardened, ground and lapped bushings and leader pins to insure accurate alignment. Individual punches and dies are mounted in the die sets and may easily be removed for replacement or regrinding. The feed of the machine combines the advantages of extreme accuracy at full speed ranges and of setup. When a complex formed stamping requires maximum machine time, the addition of a change gear allows 90 degree feeding.

Standard equipment includes: one complete die head with cam; back plate; tie bar; four high speed forming slides with cams; stripper mechanism with cam; high speed, positive grip type feed; stock check; stock straightener; brake; automatic lubrication system; and 5 h.p. variable speed drive with outputs from 80 to 400 strokes per minute.

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U. S. Model MS-28-HS High Speed Multi-Slide

August, 1961

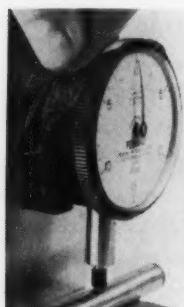
MOUNTING BRACKET FOR DIAL INDICATOR

Federal Products Corp., 1145 Eddy St., Providence, R. I., has announced an adjustable bracket for convenient mounting and positioning of Federal Dial Indicators. This assembly provides great time savings in many indicator set-ups, because indicator position can be closely and easily adjusted over a range of $\frac{1}{8}$ inch. A dovetail indicator back is attached to the indicator in place of the regular back, and fits into a mating dovetail in the mounting bracket. The position of the indicator is then adjusted by a rack and pinion arrangement, and is locked by tightening the two large clamping screws. Spring washers on the clamping screws hold the indicator in alignment during clamping, thus preventing any radial or linear

movement and maintaining the desired setting. To mount the entire assembly in place, only two holes need be drilled and tapped.

The indicator bracket comes in two models, for AGD Group 1 or 2 Federal Indicators, and with the necessary wrench. Dovetail backs are available separately for attachment to spare indicators. An adaptor for mounting AirProbes is also available.

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Mounting Bracket for Federal Dial Indicator

August, 1961

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THE NATION'S LARGEST
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**JIG AND
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CLAMPS**

AND COMPONENTS

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P. O. BOX 231 MILLERSBURG PA.

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TC

Representation Available in Several Choice Areas.
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MODERN MACHINE SHOP 201

new equipment . . .

MILL

Benchmaster Manufacturing Co., 1835 West Rosecrans Ave., Gardena, Calif., is now marketing its combination horizontal and vertical mill as a "package" unit which includes all electrics such as motor, machinist's light, 3 phase push button switch, forward-reverse switch and magnetic starter. The Benchmaster Mill has a

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{3}{16}$ " to $\frac{3}{4}$ " U. S. S. Inexpensive—last for years.



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Detroit 19, Michigan

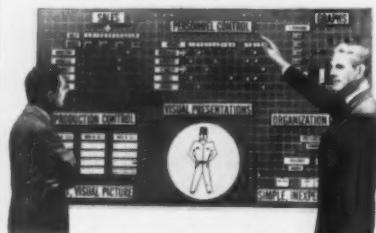
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View shows Benchmaster "Package" Mill

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COLORFUL MAGNETS • BROCHURE

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MAGNETIC
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table travel of $12\frac{1}{2}$ inches. The table size is 6 by 18 inches. The machine offers a choice of two interchangeable spindle assemblies which accommodate both vertical and horizontal milling operations on the same machine. Manual screw feed on all table motions is available or production models

FLUTED TOOLS

Cutters • Millers • Taps • Reamers

MADE AUTOMATICALLY

Economically from Solids

Get details on Miller and Grinder



WARDWELL Mfg. Co.

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can be supplied with rack and pinion feed on both vertical and longitudinal motions or longitudinal table travel alone.

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★ MODERN MACHINE SHOP ★

BUFFED STAINLESS STEEL

Universal-Cyclops Steel Corp., Bridgeville, Pa., has announced the commercial availability of stainless steel strip with a highly reflective finish called Unibrite. The Unibrite finish is a result of production line buffing at the producing mill. This brighter, more corrosion-resistant stainless was developed to meet the high quality standards and reduced finishing costs which were sought by automobile, appliance and houseware manufacturers.

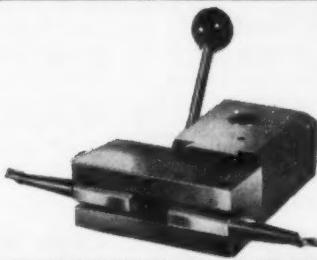
The Unibrite process is an add-



Universal-Cyclops
Buffed Stainless Steel

ed production step that imparts extra brightness and maximum corrosion resistance by buffing after processing. Consistency of finish, color, shading and reflectivity are maintained on both sides of Unibrite strip, and this uniformity is maintained from coil to coil. The Unibrite process is a coil fed five station line which can operate at speeds of 20 to 80 feet per minute. It handles coils up to 26½ inches wide and weighing 18,000 pounds. Each of

VERSATILE LIDO BORING TOOLS*



LIDO boring tools can be simply and effectively mounted in tool holders for lathe use (above) or clamped equally as simply in offset boring heads (right) due to the parallel flat design of shank. Round shank with parallel flats makes positive three-point contact and permits new rigidity in tool clamping. Set-up and grinding time is drastically reduced. LIDO tools are resharpened as easily as grinding a single point lathe tool. Available in tool room sets — carbide or HSS — in bore sizes ranging from $\frac{1}{16}$ " to $\frac{1}{4}$ " (Stubby or standard bore length) in five shank sizes. Prices and complete data provided promptly on request!



LIDO'S
THREE POINT
CLAMPING
(below, right)

PAT APPLIED FOR

LIDO
TOOLS

MANUFACTURED BY
LIDO TOOLS
1972 PLACENTIA, P.O. BOX 403
COSTA MESA, CALIFORNIA



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new equipment . . .

the stations has buffing heads for the top and separate buffing heads for the bottom of the strip. During the five station process some of the surface is actually removed before the strip is color buffed. Actual speeds, buffing compounds, and so on, are proprietary process information.

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DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

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(STANDARD and EXPANSION)

It is less costly and quicker to use Boyar-Schultz Copper Head Laps, than to make your own. Copper Head Laps are accurate and rapid to use. Nothing to wear out but the copper sleeve which is replaceable and adjustable to the correct size. Adjustment permits maintaining lapping size till worn out and replaced with new ones. Available from stock in standard sizes, $\frac{1}{8}$ " to $2\frac{1}{2}$ " diameters.

SPECIAL TOOL MAKERS
BENCH LAP SET
Consists of seven most commonly used sizes — $\frac{1}{8}$ ", $3/16$ ", $\frac{1}{4}$ ", $5/16$ ", $\frac{3}{8}$ ", $7/16$ ", $1\frac{1}{2}$ ", with enameled die cast base.

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204 MODERN MACHINE SHOP

CUTTING FLUID

A cutting fluid that has proven to perform trouble-free under extremely difficult working situations has been introduced by the Products Div., Cincinnati Milling Machine Co., Cincinnati 9, Ohio. The cutting fluid, Five-Star Cimcool, is said to not only aid machining and grinding operations so that such things as production and tool life are high, but that it also has exceptional rancidity and rust control.

Five-Star Cimcool provides excellent rust protection when working with all types of ferrous metals. This rust control is due to the two completely different types of rust inhibitors combined in Five-Star Cimcool. The cutting fluid is said to provide thorough protection against rust at dilutions as lean as 1 part of concentrate to 60 parts of water.

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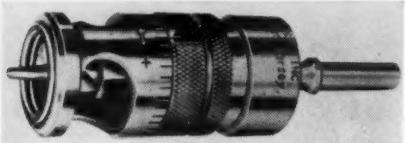
COUNTERSINK

Wohlnip Products, Inc., 634 Central Avenue, East Orange, N. J., has announced a ball joint countersink which is said to countersink all holes square and concentric. The countersink has ball joint radial float spindles, and ball bearing sleeves guide the cutter always in such a manner that the countersinking is performed automati-

NEW ADJUSTABLE BURRING TOOL . . .
a handy vest pocket scraper and burring instrument. Blades are fully retractable, replaceable and easily sharpened. Cutting length adjustable to 3", can be reversed to use either end. Made from hi-quality, hi-speed tool steel for long life. Ideal for burring in aircraft and other light metal operations—overall length $4\frac{1}{2}$ ". Complete \$2.80 each. Min. order 6—Blades \$1.25 each
Write for Additional Information.
Dealer Inquiries Invited.

TITAN TOOL SUPPLY CO.
Box 8, 68 Comet Ave., Buffalo 16, N. Y.
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August, 1961



View of Wohlrip Ball Joint Countersink

cally square and concentric to the hole.

With this design the user can countersink holes from 3/32 inch to 5/16 included and up to 5/8 inch diameter of the countersink. Instant micro adjustment may be made by loosening (turning the control sleeve to the depth of the countersinking required. Adjustments as fine as 0.001 inch are said to be made instantly. The ball bearing and spring supported control sleeve is in contact with the work before the cutting of the countersinking starts which guarantees the precise depth of the countersinks in the work.

The manufacturer states that no chips can come between the work and the sleeve. The control sleeve when contacting the work will not rotate and the ny-

lon stop ring protects the finish of the work to be countersunk, therefore no marring or scratches will appear.

For more data circle 101 on Postpaid Card

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TWIST DRILLS

Thirteen high speed steel, solid carbide and carbide tipped drills, have been added to its line by American Twist Drill Co., 14301 West Chicago

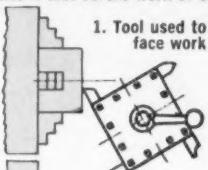
Enco **TOOL POST TURRETS**
+ .0005"

**Re-Indexing Accuracy
Guaranteed!**

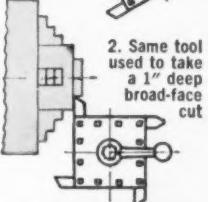
Put an Enco Turret on your lathe and get the accuracy, speed, and cost-cutting advantages that make Enco Turrets first choice of leading lathe builders. Get 12 station indexing—30°, 60°, and 90° from each of 4 tools... get smooth, effortless hand indexing... and capitalize on the advantages of Enco's exclusive, patented "O" Ring Seal that keeps indexing mechanism free of chips and dirt. There's an Enco Turret made to fit your lathe.

Makes 1 tool do the work of 3

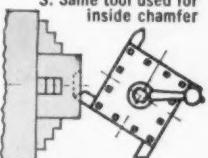
1. Tool used to face work



2. Same tool used to take a 1" deep broad-face cut



3. Same tool used for inside chamfer



TOOL SIZE	TOOL BLOCK SPECIFICATIONS	PRICES F.O.B. CHICAGO
(STANDARD)		
1/4"- 3/8"	2 1/2" sq. x 1 1/4" thick	\$ 39.00
3/8"- 1/2"	3 1/2" sq. x 1 1/4" thick	\$ 61.00
5/8"- 1/2"	3 1/2" sq. x 2 1/4" thick	\$ 76.00
5/8"- 5/8"	4 1/2" sq. x 2 1/4" thick	\$ 83.00
3/4"- 1"	4 1/2" sq. x 2 1/4" thick	\$102.00
5/8"- 1 1/4"	6" sq. x 3 1/4" thick	\$175.00
(HEAVY-DUTY)		
3/4"- 1"	4 1/2" sq. x 3" thick	\$155.00
1"- 1 1/4"	6 1/2" sq. x 3 1/4" thick	\$225.00
1 1/4"- 1 1/2"	7" sq. x 4 1/4" thick	\$265.00
1 1/2"- 2"	7 1/2" sq. x 4 1/4" thick	\$305.00

Machinable Base T-Slot Turrets carried in stock.

To order Turret fitted to your lathe, send T-Slot, center height dimensions and maximum tool size. No charge for fitting. Fast Delivery.

Enco **MANUFACTURING CO.**

Dept. # 181 4520 W. Fullerton Ave., Chicago 39, Ill.
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new equipment . . .

Bld., Detroit 28, Mich. By actual count, the thirteen different styles of drills represent over 550 different sizes.

Among the new drills now available are (A) solid carbide drills in fractional wire and letter sizes (115 sizes), (B) combined drills and countersinks (16 sizes), (C) drill blanks (137 sizes),

SAVAGE NIBBLING MACHINES

Sheet Metal Cutters

- Roller-Die Type Best for Cutting Stainless Steel
- No Sparks • No Oxidation
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- No Open Flame
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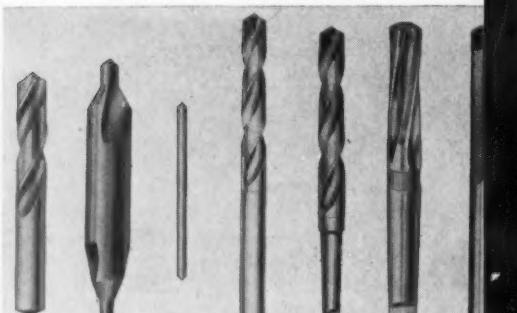
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Precision Tool & Mfg. Co. of Illinois
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MMS-81

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206 MODERN MACHINE SHOP



View shows American High Speed Steel, Solid Carbide and Carbide Tipped Drills.

(D) and (E) carbide tipped drills, straight and taper shank in fractional, wire and letter sizes (210 sizes), (F) carbide tipped core drills (33 sizes), (G) drills for hardened steels (44 sizes). All of these American Drills are "standards."

For more data circle 102 on Postpaid Card

★ modern machine shop ★

RECORDING AND INDICATING CONTROLLERS

Barber-Colman Co., Wheelco Industrial Instruments Div., 44 Loomis St., Rockford, Ill., has announced the Double-O line of round chart recording and indicating controllers. The attrac-

DRESS CENTERS FAST-ECONOMICALLY

WITH ABRASIVE CENT-R-LAP TOOL



Eliminates time and dust of diamond dressing • Removes scale • Laps without chatter. Sold in three sizes direct to consumer. Send for literature and prices.

J. R. REICH MFG. CO.
P.O. BOX 2152 DAYTON 29, OHIO

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August, 1961

tively styled Double-O Controllers are completely self-contained, null-balancing instruments requiring only an external sensing device. A wide range of models is available for the measurement, indication, control and permanent recording of temperatures. With proper circuitry and the use of transducers, such variables as speed, strain, hydrogen ion (pH) and other quantities which can be resolved into electrical signals can be recorded and controlled. The Double-O swing-away design allows easy access for quick change of range, control form, cross chart speed, charts and all major or adjustable components. All operational servicing is accomplished in minutes.

Double-O Indicating Controllers are highly legible and highly accurate. Bold-figured 32 inch scale means easier reading. The scale is stationary — only the set point and control point move.

This line gives $\frac{1}{2}$ of 1 percent



*View of Wheelco
Double-O Controller*

August, 1961

accuracy for all scale spans in pyrometric range. All thermocouple and radiation pyrometer ranges down to 5 MV full scale are available. Full-scale balance speed is 4 seconds. The full-size 12 inch chart has a calibrated width of $4\frac{1}{8}$ inches.

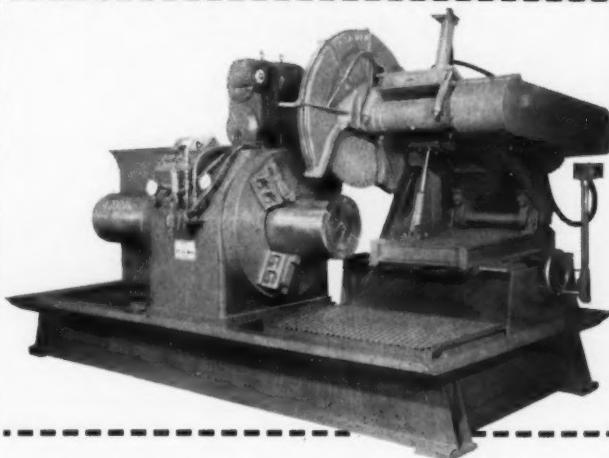
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DUPPLICATOR TABLES

The Regent Line of 2 and 3 dimensional duplicator tables distributed by

Orbit Saw Cuts Rotating Metal-- Single or Double Chucks Up to 22" O.D.



If you produce large rounds or squares, the new Rotator will reduce your cutting time to a minimum . . . 16 to 20 square inches per minute on hard alloys. It's the only rotator-type saw with a chuck that will hold rough forgings and rounds, as well as conventional rounds up to 22" diameter. Material is rotated as it is cut, keeping a cooler surface at the point of blade contact . . . result — longer blade life. Self-contained and portable, with integral tank and re-circulation pump.

Ty-Sa-Man

SINCE 1885

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MODERN MACHINE SHOP

207

FREE REPRINTS

The following reprints are available free of charge in limited quantities upon letterhead request to this magazine:

- "Aerodex Keeps Them Flying"
- "Automatic Tracing Speeds Mold Production"
- "Build-Up Tooling Saves Production Time and Cost"
- "Cold Extruding Steel Alloys to Precision"
- "Causes and Cures of Heat Treating Distortions in Tools and Dies"
- "Crankshaft Repair"
- "The Forward Look—Rx for Space Age Shop Obsolescence"
- "Facts You Should Know About Cutting Fluids"
- "Good Clamping Saves Time"
- "How To Sharpen Face Mills"
- "Hobbing Automatic Transmission Shafts"
- "Hogging—A Job Shop Specialty"
- "Milling Applications Unlimited"
- "Portable Radiant Heater Simplifies Hot Forming Work"
- "Sub-Zeroing Improves Pinion Performance"
- "Tape Control of Manufacturing Processes"
- "Welder Manufacturer Reverses Import Trend"
- "The Supervisor and His Boss"

modern machine shop

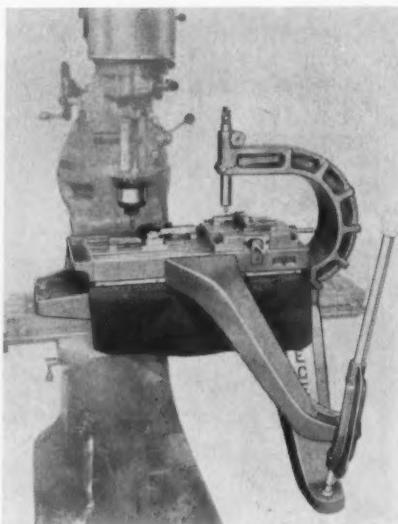
431 Main St., Cincinnati 2, Ohio

new equipment . . .

J. M. Kalins & Co., 1575 Railroad Ave., Bridgeport, Conn., has been improved to provide for greater efficiency and ease of operation. Among the improvements is a redesign of the duplicator's ball-bearing raceways for greater rigidity and smoother operation. The duplicator's overarm has also undergone redesign for greater rigidity.

The Regent Line features the R-200, 2 dimensional fluid motion duplicator for contour profiling on any vertical miller and the R-300 for fast, accurate 2 and 3 dimensional duplicating and profiling of complex machined parts on Bridgeport millers only. Completely self-contained, the duplicator mounts on the milling machine in a matter of minutes. Its single lever table control enables even the inexperienced operator to duplicate the most complicated shapes.

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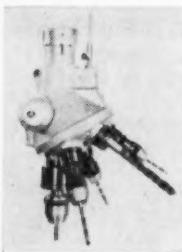


The Regent 2 Dimensional Duplicator Table

MULTI-SPINDLE DRILL HEAD

A unit named the Arbo-3 has been introduced by Jersey Manufacturing Co., 401 Livingston St., Elizabeth, N.J. The Arbo-3 is an ingeniously designed automatic revolving and indexing multi-spindle drill head that takes 2 to 5 tools at one time. All spindles are completely and quickly interchangeable. Eight independent speeds are available. All work spindles are provided with suitable Morse and Jacobs tapers, and with suitable drilling and tapping chucks. Special tapers may be had upon request.

Outstanding advantages are as follows: work-pieces completely machined with single set-up; changes speeds quickly; no reversing of drill spindle necessary during tapping operation; automatic indexing accomplished with



Jersey Arbo-3 Multi-Spindle Drill Head

motor, independently of drill press motor; complete interchangeability of spindles. The unit has a capacity to drill $\frac{1}{8}$ to 1 inch and to tap $\frac{1}{8}$ to 15/16 inch.

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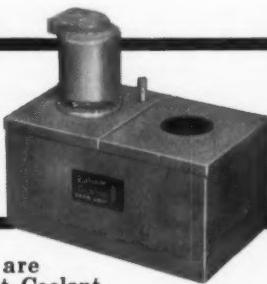
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TUBE MARKING MACHINE

An automatic tube marking machine designated as Model ETMA has been

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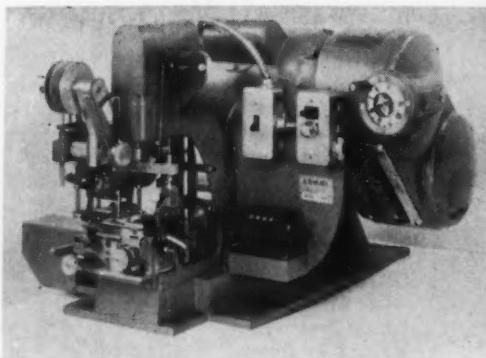
Cincinnati 2, Ohio

- COOLANT PUMPS
- CIRCULATORS • AGITATORS
- MOLTEN METAL PUMPS

new equipment . . .

introduced by the Acromark Company, 9 Morrell St., Elizabeth, N. J. The machine automatically feeds, marks, and cuts to desired length all types of flexible plastic tubing used to produce identification and code markers for wire, cable, hose, and tubing. The Acroleaf Model ETMA has been designed to produce a marker cut to accurate length with the imprints centered and permanently impressed on the plastic. Acroleaf is a dry heat bond process, therefore the markers may be used immediately.

The variable speed motor drive permits production of from 60 to 190 pieces per minute, depending on size and length. The feed is adjustable for tube marker lengths ranging from $\frac{1}{8}$ inch to 2 inches. The feed is provided with a self-centering nest with screw adjustment so that tube sizes from $\frac{1}{8}$ to 1 inch o.d. may be processed. Mi-



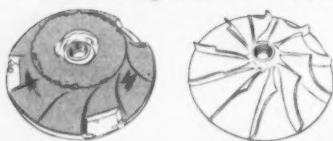
Acromark Model ETMA Tube Marking Machine

crometer adjustment for pressure setting is provided. Tube cutters have replaceable carbide cutting faces and adjustable shear pressure. A predetermined automatic counter stops the machine when a preset count is reached.

The heating elements are highly serviceable and immediately replaceable. The ETMA is provided with automatic temperature control with adjustment ranging from 200 degrees F. to 600 degrees F., to handle vinyl, polyethylene, and other plastic materials. Overall size of the Model ETMA Machine is 22 by 18 by 28 inches deep, including variable speed motor. Shipping weight is 260 pounds.

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CERROTECHNICS *saves* TIME-LABOR-MONEY in machining turbine rotors



CERROTECHNICS is the practice of using low-temperature melting CERRO[®]ALLOYS to expedite many industrial operations.

For instance: An aircraft manufacturer supports the thin blades of turbine rotors in CERROBEND[®] to prevent distortion in machining. Then the alloy is melted away at 158° F. Write for further information.

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NEW . . . Portable

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5" x 4", All cast construction, Oiline bearings, 45° swivel vise, 7" ball bearing wheels, motor, ready-to-go.

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Factory**

KELLER Power Hacksaws are available in 5 sizes, 12 models.

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or write:

Sales Service Mfg. Co.
2361 University Ave., St. Paul 14A, Minn.
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ALUMINUM FANS FOR DUST COLLECTORS

Aget Manufacturing Co., 1398 East Church St., Adrian, Mich., has announced spark-proof cast aluminum fans for its entire "2000 Series" of dust collectors. The fans, cast from a special heat treated alloy, have many advantages, they are light in weight and blades are moulded into position for greater strength and rigidity.

In the past, spark-proof fans have been available as special equipment, but at an added cost. Now with the new design and manufacturing techniques they are offered, without additional cost, on the 2000 Series.

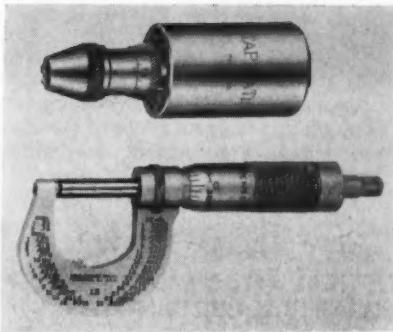
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★ MODERN MACHINE SHOP ★

DRILL SPEEDERS

A revolutionary development in speed transmission engineering has been announced by Tapmatic Corp., 845 West 16th St., Costa Mesa, Calif., in the presentation of its line of gearless drill speeders. Their high speed ratios are attained through a most unique and compact all ball bearing design. The Tapmatic Drill Speeder Model 62, for example, has a standard ratio of 7:1 although it weighs only 9 ounces and has a major diameter of 1 5/16 inches.

Small hole drilling may be efficiently performed on machines with relatively low maximum spindle speeds.



View shows Tapmatic Gearless Drill Speeders

Drilling speeds up to 22,500 r.p.m. are possible even on machines which have maximum spindle speeds of only 1,500 r.p.m. The complete elimination of gears in the construction of these drill speeders assures quiet, vibrationless operation. This is an important advantage in small hole drilling. The

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Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
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3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

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Tool Room Equipment Since 1918
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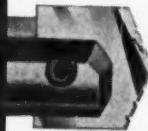
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HOLES

ECONOMICAL • FAST DRILLING
DEEP HOLES IN ONE PASS!

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August, 1961

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MODERN MACHINE SHOP 211

new equipment . . .

units are manufactured with threaded or tapered mounts for universal application on virtually all types of manual, semi or completely automated drilling machines.

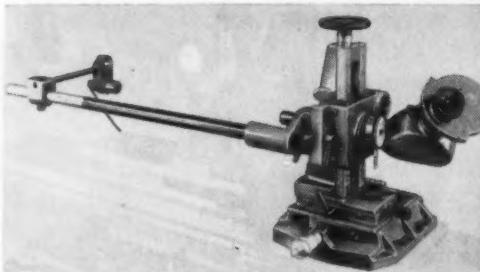
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OPTICAL ATTACHMENT FOR VISUAL GRINDING

The Profiloscope, an instrument that provides visual control for precise grinding on surface and cylindrical grinders has been announced by the Parker-Hartford Corp., 650 Franklin Ave., Hartford, Conn. Providing continuous optical inspection through all stages of form grinding, the Profiloscope is an independent optical unit that can be attached to standard grinders already in use. Width, depth and coordinate checks are facilitated to readings 0.0002 inch on special form tools.

Essentially, the Profiloscope consists of a microscopic eyepiece through which are seen the wheel and workpiece, magnified 25, 50 or 100 times and superimposed over the desired form on a reticle. Six standard reticles are contained in a rotating turret head on the instrument. They are marked with male and female radii, angles, and horizontal and vertical lines.



Optical Attachment for visual grinding

Special full form reticles can also be supplied.

Simultaneously with the Profiloscope, Parker-Hartford is introducing the Projectorscope, an instrument that performs the same function but projects the readings on a large screen rather than through the eyepiece.

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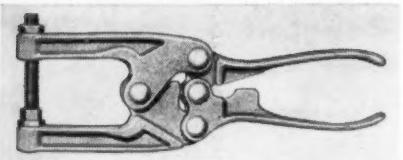
TOGGLE PLIER

Toggle-action pliers, the P-1600 and P-2400 Series, have been introduced by Lapeer Manufacturing Co., 3048 Davison Rd., Lapeer, Mich. Featuring long, comfortable handles, the P-1600 plier is designed to apply a clamping force of 1600 lb. at the spindle on application of normal hand pressure. It is available with a throat depth of 2 $\frac{1}{4}$ inches and throat gaps of 1 3/16, 3, 4 and 6 inches. Manufactured from

REPRINT AVAILABLE

A limited number of copies of a reprint "Let's Discuss Numerical Control in Simple Language" are available. Quantities up to 25 copies are offered free of charge. Additional copies are available at a price of 10 cents each.

MODERN MACHINE SHOP
431 Main St., Cincinnati 2, Ohio



View of Lapeer Series P-1600 Toggle Plier

steel forgings these pliers are heat-treated and cadmium plated.

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DRY-FILM LUBRICANT

Molykote X-15, an inorganic-bonded, dry film lubricant with a useful temperature range of from minus 300 to plus 1200 degrees F., is now being produced by The Alpha-Molykote Corp., Stamford, Conn. In addition to its wide temperature range, Molykote

X-15 is insensitive to liquid oxygen; has proven to be unaffected by up to 5 by 10^6 roentgen gamma radiation; retains its lubricating properties under vacuums up to 10^{-9} mm of Hg; and is easy to apply in either shop or field.

Molykote X-15 can be applied by brushing or spraying. It air dries to a tough, resilient coating in one hour at room temperature. Wear life can be increased by allowing the coating to air dry for 30 minutes and then baking at 180 degrees F. for one hour. Surfaces should be cleaned before application. Removal of all organic residues is essential for oxygen service. No other surface pretreatment is necessary, but sandblasting or liquid honing will increase the wear life of the coating. Because it is used in liquid oxygen service, and with other active reagents, Molykote X-15, a dry-film lubricant, is formulated and packaged with strict laboratory care.

"ONE HOE FOR KALABO"

Sound and color 16 mm. movie film telling what machine tools are and what they do.

Culmination of several years of planning and production by the machine tool industry.

Designed primarily as a public education project.

Copy of film is available on free loan basis for showing to groups. Requests should be directed to Film Editor, Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio, and should specify the date of showing, the name of the organization requesting the film, the individual to whom the film should be addressed, address and telephone number.

MODERN MACHINE SHOP



WHERE TO GET IT



-A-

Abrasives, Grain, Cloth, Paper, Disc, etc., 14, 31, 40, 41, 66, 67
Adapters, between 48 and 49
Alloys, 39, 63, 172, 210

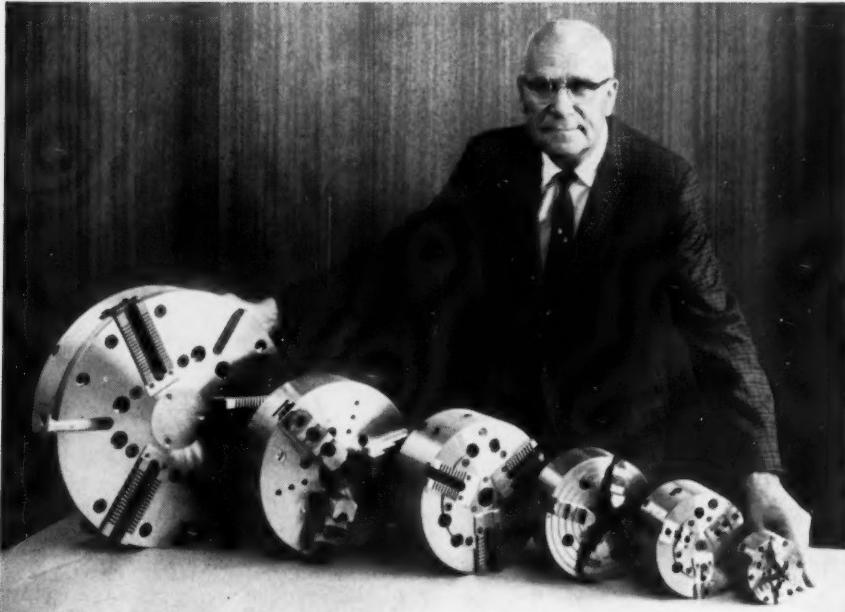
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Left to right:

- 6 of the 15 types of Buck chucks.
- 1. Aluminum power chuck with gibbed keyways
- 2. Dust proof chuck
- 3. Steel Power chuck, Serrated Jaws
- 4. Independent chuck
- 5. Steel Power chuck, American Standard
- 6. 6 jaw Ajust-Tru

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You start saving—on production or in the tool room—the day you put Buck Ajust-Tru chucks to work.

MANUAL chucks adjust for dead true precision in a minute—guarantee .0005" precision chucking duplicate parts.

POWER chucks—steel or aluminum body, regular or serrated jaws—guarantee precision within .001" and provide many other exclusive operating savings.

It's the unique, patented Buck Ajust-Tru principle that makes Buck chucks so different—at no price premium. It'll be well worth it to get full details.

NEW Catalog 61 ready—write for it.

BUCK TOOL COMPANY

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where to get it . . . (Numbers shown are page numbers in this issue)

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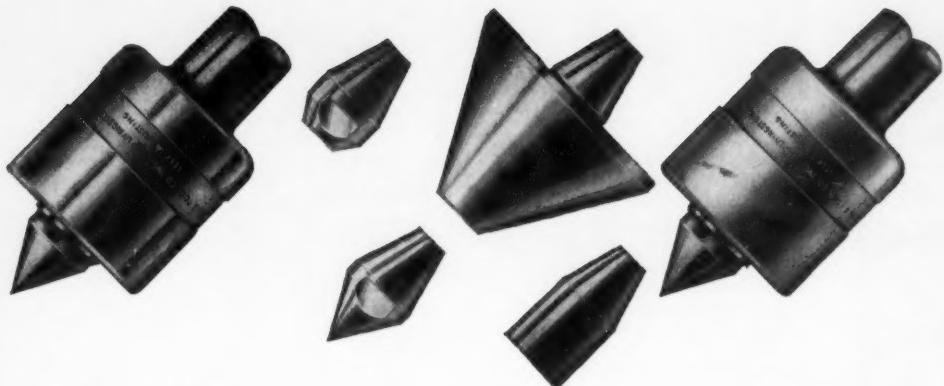
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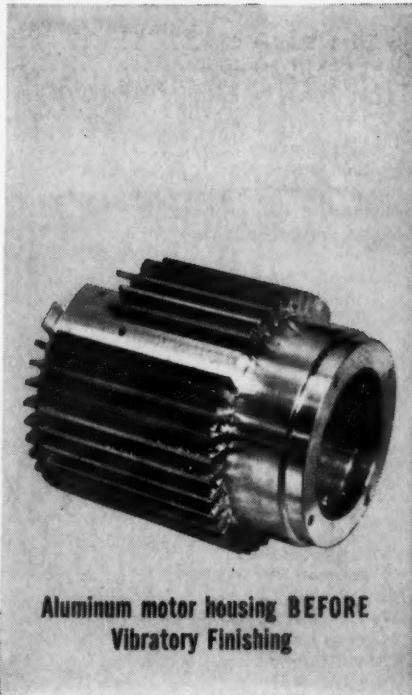
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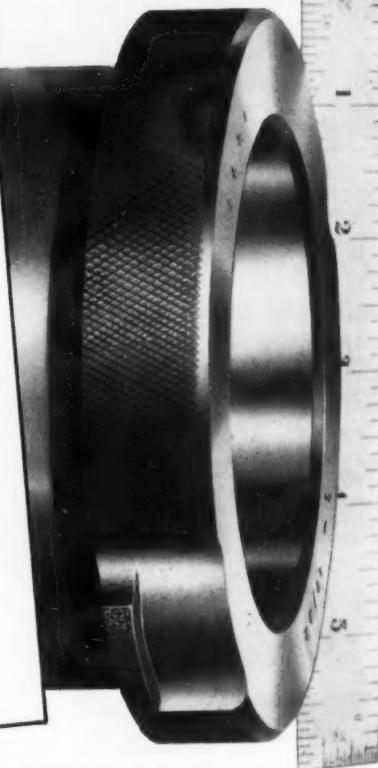
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COMPARE COSTS! up to 50% lower!

12-time rates for the six top 7 x 10 metalworking publications range from \$600 to \$770. MODERN MACHINE SHOP gives you more in circulation, more in plant coverage . . . saves as much as 50%!

Only \$385 per page (12-time rate)
lowest cost per thousand \$7.13.

COMPARE CIRCULATION! over 54,000 . . . over 36,000 plants . . .

The top six 7 x 10 metalworking publications have circulations ranging from 30,220 to 48,278. MODERN MACHINE SHOP delivers up to 14,000 more!

COMPARE RESULTS! 47.9% of inquiries are saleable!

In an analysis of MODERN MACHINE SHOP inquiries, 47.9% of the inquiries represented actual or potential sales. Over 70% of MODERN MACHINE SHOP circulation is verified direct with the reader.

SPECIAL OFFSET SECTION eliminates plate costs

Now MODERN MACHINE SHOP offers superb offset reproduction for your 7" x 10" ads, completely eliminating any plate or special art or production costs. All that is required is a clean black and white proof (one for each color) and a color proof. Your 7" x 10" ads can be adapted to full page or spread size.

Write for Complete Media Data
File and SIC Circulation Analyses.

CIRCULATION BREAKDOWN BY STANDARD INDUSTRIAL CLASSIFICATION

(Based on Dec. 1960)

19	Ordnance and Accessories . . .	231
20	Food and Kindred Products . . .	128
22	Textile Mill Products . . .	143
25	Furniture and Fixtures—Metal . . .	581
26	Paper and Allied Products . . .	215
27	Printing, Publishing and Allied Industries . . .	77
28	Chemicals and Allied Products . . .	351
29	Products of Petroleum and Coal . . .	121
30	Rubber and Misc. Plast.c Products . . .	439
32	Stone, Clay and Glass Products . . .	461
33	Primary Metal Industries . . .	3,096
34	Fabricated Metal Products . . .	8,849
35	Machinery—Except Electrical . . .	19,233
36	Electrical Machinery, Equipment and Supplies . . .	5,970
37	Transportation Equipment . . .	6,180
38	Professional, Scientific and Controlling Insts., Photographic and Optical Goods, Watches and Clocks . . .	1,947
39	Miscellaneous Manufacturing Industries—Metal . . .	1,098
40	Railroads . . .	254
50	Wholesale Trade (Mill Supply Houses, Machinery Dealers, etc.) . . .	2,145
82	Schools, Colleges, Libraries . . .	593
8911-21	Engineering and Scientific Research Services . . .	295
90	Government . . .	223
	Other SIC Groups . . .	466
	Agencies—Exchanges—Samples and File . . .	1,404
	TOTAL . . .	54,500

ADVERTISING BREAKDOWN BY PRODUCTS

January 1960 through December 1960

	PAGES	PERCENTAGE
MACHINE TOOLS . . .	892	37%
MACHINE PARTS AND ACCESSORIES . . .	572	24%
CUTTING TOOLS . . .	431	18%
MISCELLANEOUS METAL- WORKING TOOLS AND ACCESSORIES . . .	517	21%
TOTAL . . .	2,412	100%

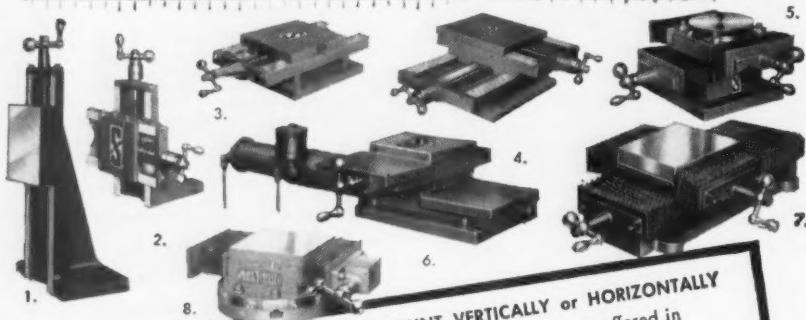
modern
machine shop

431 Main St. • Cincinnati 2, Ohio

Also publishers of *PRODUCTS FINISHING* and *Products Finishing DIRECTORY*

For more data circle 523 on Postpaid Card

AUTOMATION = **Rotation (Spindles)** by **STANDARD**
BUILDING BLOCK **Movements (Feeds-Swivels)**



... just a few
of the SLIDES-FEEDS-SWIVELS or Combinations thereof as offered in
STANDARD's New Catalog No. 22... ask for your Copy.

ANGLE PLATE MOUNTING: Fig. 1 with Vertical Feed. Fig. 2 with Vertical and
Horizontal Feed.

BASE MOUNTING: Fig. 3 with Horizontal Feed. Figs. 4, 5, 6 and 7 with Com-
pound Feeds.

AVAILABLE ON ANY FEED: Power Cylinders (Figs. 6, 10 and 11); Accordion
Protectors (Figs. 5, 7 and 8); Right Angle Feeds (Figs. 8 and 9); 360° Swivel
Work Base (Fig. 5); 360° Mounting Base (Figs. 8, 9, 11, 12 and 13).



Use
SLIDES-FEEDS-SWIVELS for
SPINDLES-WORK-FIXTURES
ALIGNMENT INSTRUMENTS

"BUILDING-BLOCK" ASSEMBLIES with
STANDARD Feeds and Swivels and
STANDARD Super Precision Spindles



Since 1912

the STANDARD electrical tool co.
PRECISION SPINDLE AND MACHINE TOOL DIVISION
2487 RIVER RD. • CINCINNATI 4, OHIO

For more data circle 524 on Postpaid Card



REMEMBER WHEN...

You Couldn't Afford Scrap?

You still can't! As a manufacturer, one of the primary problems you face today is probably the reduction of scrap. Many manufacturers are using American machine tools to lick the scrap problem.

Take the United States Beryllium Corporation, for example...

To produce 9" diameter memory drums for computers from the light but strong space-age metal, beryllium, requires extreme precision. Specifications for these drums called for lathes which would hold flatness, roundness, squareness and size to .0001" or less. Because the raw material is extremely expensive, scrap would be disastrous. Anything less than the best lathe could not be considered.

That's why the United States Beryllium Corporation plant at Inglewood, California chose American Lathes. According to Mr. Frank Hverdejus, Vice President of U. S. Beryllium, their Americans are turning perfectly round within .000050" to help produce these beryllium memory drums with an absolute minimum of scrap.

"Impossible" jobs are routine for American Lathes. Thanks to their carefully engineered rugged

design, they keep on performing their accurate jobs year after year in tool room, maintenance and production applications.

If you have a scrap problem, contact your American distributor. Learn how you can secure American Lathes and American Radial Drills on "Toolease," our popular leasing plan. Or, write Section 164 at the address below. Ask for bulletins 116 and 301.



American Lathes perform precision turning in the "hospital clean" shops of the United States Beryllium Corporation.

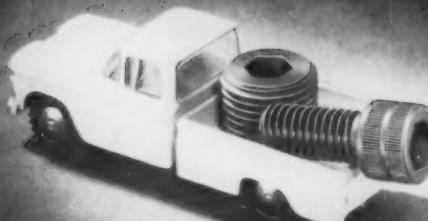
For more data circle 303 on Postpaid Card



THE AMERICAN TOOL WORKS COMPANY

PEARL STREET AT EGGLESTON AVENUE • CINCINNATI 2, OHIO

Think Delivery . . .



**HOLO-KROME'S SAME-DAY SERVICE ON THERMO-FORGED* SOCKET SCREWS
PREVENTS DOWNTIME ON YOUR PRODUCTION LINE**

Downtime costs profit dollars . . . that's why you've got to be sure the fasteners you vitally need arrive at your plant *on time*. And that's why Holo-Krome's Same-Day Service is so important to you. Packaged goods shipped *same day the order comes in*—most specials shipped in four weeks or less!

For profit-making quality and on-time delivery, standardize on Holo-Krome THERMO-FORGED socket screws. See your authorized Holo-Krome distributor or write for more information.



*Trade Mark of The Holo-Krome Screw Corporation

For more data circle 304 on Postpaid Card

HOLO-KROME
*Thermo-Forged**
SOCKET SCREWS

SOLD ONLY THROUGH AUTHORIZED HOLO-KROME DISTRIBUTORS
THE HOLO-KROME SCREW CORPORATION • HARTFORD 10, CONN.

modern

SEPTEMBER 1961